Food and Agriculture Organization of the United Nations

NEAR EAST AND NORTH AFRICA

REGIONAL FOREST RESOURCE ASSESSMENT 2020

EXTENT, CHANGES AND TRENDS

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EXTENT, CHANGES AND TRENDS

Food and Agriculture Organization of the United Nations
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FOREWORD

Forests and other wooded land in the Near East and North Africa (NENA) region are of great importance for environmental protection, biodiversity conservation, rural income improvements, livelihood support, their cultural and social values and the multiple other goods and services that they provide. However, the region's growing population and the rapid land use-changes affect these fragile ecosystems, leading to their degradation, loss of forest biodiversity and an increased risk of land degradation and desertification. The threats to forests in NENA are further worsened by the effects of climate change.

Forest ecosystems provide goods and services that reduce the vulnerability of local communities and broader society to climate change, but adaptation measures are needed to enhance the adaptive capacities of the region' forests to the growing impacts of climate change, reduce negative impacts on biodiversity and maintain ecosystem functions. Preserving these ecosystems and maintaining their integrity is not only key to protecting the environment and sustaining people's livelihoods but is also critical for human health and well-being, as clearly manifested in the growing recognition of the crucial role of forest adaptation in COVID-19 green recovery and in building a more resilient and sustainable future.

The basis for any sustainable forest management and use is knowing the extent and condition of the forest resources. NENA Forests are limited in their extent and they are declining. Many parts of the NENA region are considered biodiversity hotspots with a considerable numbers of endangered endemic species. These include the Mediterranean basin that extends from Morocco to Turkey, The Caspian region of Islamic Republic of Iran and coastal Red Sea areas of Saudi Arabia, Yemen and the Sudan, which are part of the Horn of Africa biodiversity hotspot zone. The conservation of the region' forests and its biodiversity resources require well-balanced, evidence-based planning and sustainable management actions.

Benefiting from the national reports submitted by the NENA countries to the FAO Global Forest Resource Assessment (FRA) 2020, and some other recent regional reports, the FAO Regional Office for the Near East and North Africa undertook the task of preparing a regional forest resource assessment report that provides regional bodies, national governments and the forestry community in the region with up-to-date information on the state of forest resources in the region.

In addition to the extent and changes in forest cover, the report provides data on the main characteristics of the forests in the region; biomass and carbon stock and removals, and areas of forests designated for biodiversity conservation and for the protection of soil and water. The report also reflects on the values of non-wood forest products often collected by rural communities, employment opportunities provided by the forestry sector, the status of forestry education and on the contribution of the sector to Sustainable Development Goal 15 – life on earth.

It is hoped that the information provided in the report will support the efforts of forestry institutions in the region in awareness raising, advocacy, evidence-based planning and improved programming and investment in the sector. The detailed data offered by the report will also enhance the ability of countries to meet their national and global reporting obligations, including those under multilateral environmental agreements and the 2030 Agenda for Sustainable Development, while providing solid base line for monitoring these resources.

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ACRONYMS AND ABBREVIATIONS

AGB	above-ground biomass
BGB	below-ground biomass
FAO	Food and Agriculture Organization of the United Nations
FRA	Forest Resources Assessment
FSC	Forest Stewardship Council
GDP	gross domestic product
ILO	International Labour Organization
IPCC	Intergovernmental Panel on Climate Change
ISIC	International Standard Industrial Classification of all Economic Activities
IUCN	International Union for Conservation of Nature
NACE	Nomenclature of Economic Activities
NENA	Near East and North Africa
NFI	National Forest Inventory
NGO	non-governmental organization
NWFP	non-wood forest product
OLWTC	other land with tree cover
OWL	other wooded land
PEFC	Programme for the Endorsement of Forest Certification Schemes
SDG	Sustainable Development Goal
UNCTAD	United Nations Conference on Trade and Development
USD	United States dollar

KEY FINDINGS

1. FOREST EXTENT, CHARACTERISTICS AND CHANGES

Forest area

The total forest area in the Near East and North Africa (NENA) region as of 2020 is 41.5 million ha, equivalent to 1 percent of the world's total. In addition, the region has 33 million ha of other wooded land (OWL). Forests cover 2.95 percent of the land area of the region, and OWL 2.35 percent. Together forests and OWL cover 5.3 percent of the region's total area. The remaining 94.7 percent is other land, which to a large degree is arid desert. Fifty percent of the forest area in the region is in the subtropical domain, 49 percent in the tropical domain and 1 percent in the temperate domain (in northern Islamic Republic of Iran).

Forest area is very unevenly distributed among and within countries. Three countries (the Sudan, the Islamic Republic of Iran and Morocco) account for 84 percent of the 2020 total forest area. Forest cover varies from 0 percent in Qatar to 14 percent in Lebanon.

Forest characteristics

Naturally regenerating forests cover 38 million ha, equivalent to 92 percent of the total forest area of the region, the remaining 8 percent is planted forest (3.2 million ha). Plantation forest accounts for 76 percent of the planted forest area, at 2.4 million ha, of which 31 percent is introduced species. Five countries reported no naturally regenerating forest in 2020.

AREA CHANGES

Forest

Over the 30 years from 1990 to 2020 the NENA region experienced a net loss of forest cover of 6 percent (2.8 million ha), representing an average annual net reduction of 95 000 ha (or 0.2 percent/year), driven mainly by land-use changes in the Sudan. However, 12 of the 20 NENA countries reported a larger forest area in 2020 than in 1990, while only three (the Sudan, Mauritania and Oman) reported smaller forest areas. The size of the forest areas converted to other land uses in the Sudan and Mauritania exceeded the increases in forest cover in the other NENA countries. For a more differentiated picture, area data are considered separately for the Sahel and non-Sahel countries:

- Sahel countries in the NENA region (Mauritania and the Sudan) display a continuous net decrease of forest area averaging 180.000 ha/year and totalling 5.4 million hectares between 1990 (when the loss was 0.75 percent) and 2020 (when it was 0.87 percent), with no indication of a slow–down.
- The net change in aggregated forest cover in the region's non-Sahel countries is positive for the period 1990–2020: a total of 2.5 million ha additional forest was reported, equivalent to 84 000 ha/year. Part of the reason for this growth may be changes in assessment methodology and data availability.

Most deforestation in the NENA region occurs in naturally regenerating forest, which declined from 42.2 million ha in 1990 to 38 million ha in 2020 (a reduction of 4.1 million ha or 10 percent). During the same period, the area of planted forest expanded, from 2 million ha in 1990 to 3.2 million ha in 2020 (an increase of 1.2 million ha or 60 percent). Plantations make up about 76 percent of planted forests in the region and the proportion of planted forests increased from 4.47 percent of total forest land in 1990 to 7.65 percent in 2020, using mainly domestic species.

Other wooded land (OWL)

At the regional level, there was a 15 percent decline in the area of OWL between 1990 and 2020. A total of 6 million ha of OWL was converted to other land uses, representing an average reduction of 200 000 ha/year (or 0.5 percent). The Sudan and Mauritania account for two-thirds of the region's OWL in 2020, and for 96 percent of the loss of OWL over the three decades from 1990 to 2020.

2. FOREST GROWING STOCK, BIOMASS AND CARBON

Forest growing stock

The 2020 estimated total forest growing stock of the NENA region is 1.2 billion m^3, equivalent to 0.2 percent of the global total. The total reported growing stock of the region increased by 10.75 million m^3 (0.9 percent) between 1990 and 2020 (at an average of 0.36 million m^3/year or 0.03 percent). Some of the increase may be due to changes in definitions and assessment methodologies at the national level leading to higher average estimates for growing stock per hectare.

The Sudan, Mauritania and Oman reported declining forest growing stocks between 1990 and 2020 owing to decreasing forest areas. As deforestation in the NENA region occurs primarily in sparsely stocked forest areas in the NENA-Sahel countries, it results in a higher average growing stock/ha for the remaining forests.

The total forest growing stock of the NENA region is very unevenly distributed among and within countries. The three countries with the largest total forest growing stocks – the Islamic Republic of Iran (469 million m^3, 39 percent of the total for the region), the Sudan (367 million m^3, 30 percent) and Morocco (153 million m^3, 13 percent) – account for 82 percent of the region's total forest growing stock and ten countries account for 98 percent of the total.

Naturally regenerating forests account for 1.1 billion m^3 (95 percent) of the reported forest growing stock of the NENA region and cover 38 million ha. The reported average growing stock/ha for naturally regenerated forest in the region is 29.3 m^3/ha (ranging from 8.4 m^3/ha to 55.1 m^3/ha).

Planted forests account for 64.2 million m^3 (5 percent) of the reported forest growing stock and cover 1.9 million ha. The reported average growing stock/ha for planted forest in the region is 33.3 m^3/ha (ranging from 20 m^3/ha to 120 m^3/ha).

Plantation forests (a subcategory of planted forests) account for 27.5 million m^3 (2.3 percent) of the reported forest growing stock of the NENA region and cover 1.1 million ha. The weighted average growing stock/ha for plantation forest in the region is 25.1 m^3/ha (ranging from 20 m^3/ha to 31.56 m^3/ha).

Other wooded land in the NENA region contains a growing stock of 87.9 million m^3, equivalent to 7.3 percent of the reported forest growing stock of the region and covering 33 million ha. The reported average growing stock per hectare of OWL in the region is 3.3 m^3/ha (ranging from 0.85 m^3/ha to 8.5 m^3/ha).
Twenty species/genera account for two-thirds of the reported growing stock of the NENA region, of which only Eucalyptus is an introduced species.

Biomass
Biomass in tonnes/ha is derived from the growing stock (m^3/ha) and the forest area (ha). Seventeen countries reported on above and below-ground biomass (living biomass) while four reported on dead wood. The reporting of living biomass varies from 20.00 tonnes/ha (Yemen) to 175.83 tonnes/ha (the Islamic Republic of Iran). As living biomass is a function of total growing stock, the main trends are reflected in the data on growing stock in the previous subsection.

Carbon
The reported carbon stock in living biomass in the NENA region for 2020 is 1.8 billion tonnes, equivalent to an average of 44 tonnes of carbon/ha. In addition to carbon pools from living biomass, four countries reported on the litter carbon pool (averaging 3.26 tonnes carbon/ha) and four countries on the soil carbon pool (averaging 27.28 tonnes carbon/ha). As is the case for growing stock and biomass stock, the living biomass carbon stock of the NENA region is very unevenly distributed among and within countries. The three countries with the largest forest carbon stocks in living biomass are the same as those with the highest total forest growing stocks: the Islamic Republic of Iran (889 million tonnes, 49 percent of the total for the region), the Sudan (618 million tonnes, 34 percent) and Morocco (150 million tonnes, 8 percent).

3. FOREST DESIGNATION AND MANAGEMENT OBJECTIVES

Twelve countries, accounting for 95.5 percent of the region's forest area, reported on their primary forest management objectives. Between 1990 and 2020 the proportion of the forest area of NENA region with designated primary management objectives increased. In 1990 the primary management objective for 48 percent of the forest area was unknown. By 2020 this proportion had fallen to 34 percent, equivalent to 14.1 million ha. In the broad categories of management objective, the following net changes occurred between 1990 and 2020:

- The area of *production forest* increased by 22 percent, reaching 3.1 million ha in 2020, equivalent to 7.4 percent of the total forest area of the region.

- The area of *forest managed for the protection of water and soil* decreased by 23.5 percent, mainly because of a reduction in the Islamic Republic of Iran. In 2020, protection of soil and water was reported as the primary management objective for 6.8 million ha (16.4 percent) of the region's total forest area.
- The area of *forest managed for the conservation of biodiversity* increased by 62 percent. In 2020, the area of forest designated primarily for biodiversity conservation was 8.2 million ha, equivalent to 19.8 percent of the region's total forest area.
- The area of *forest designated primarily for social services* was 165 000 ha (in Morocco and Algeria) in 2020, equivalent to 0.4 percent of the region's total forest area.
- The area of *forest for multiple use* increased by 38 percent, reaching 9.1 million ha or 21.9 percent of the region's total forest area in 2020.
- The area of *forest for which the management objective is unknown* decreased by 34 percent. This is still the largest category, covering an area of 14.1 million ha (mainly in the Sudan) equivalent to 34 percent of the region's total forest area. Part of the explanation for the decrease may be that deforestation is more likely to occur in areas with unknown management objectives.

4. FOREST OWNERSHIP AND MANAGEMENT RIGHTS

Ownership

In 2015,[1] 78.4 percent of the forest area in the NENA region (33.2 million ha) were publicly owned, 19 percent (8 million ha) were under private ownership, for 0.16 percent (66 000 ha) the ownership was unknown, and for 2.4 percent (1 million ha) the ownership was not reported. Countries vary from 0 percent privately owned forest (e.g. Islamic Republic of Iran) to 95 percent privately owned (Yemen).

At the regional level, a 4 percent increase in forest area under private management was reported between 1990 and 2015, driven by increases in the Sudan and Mauritania, which also reported significant decreases of publicly owned forest area (of 26.5 percent and 48.6 percent respectively) over the same period, a possible indication that most deforestation in the Sahel countries of the NENA region is occurring in publicly owned forests.

Holders of management rights within publicly owned forests

The area of publicly owned forest in the NENA region is 33.2 million ha and nearly all of it (99.6 percent) is managed by a public administration. The proportion remained constant from 1990 to 2015. Only 0.3 percent is managed by private entities (40 000 ha in Morocco and 71 000 ha in the Sudan). For the remaining 0.1 percent, the management rights are unknown. No areas of publicly owned forests have devolved management rights to locals, tribes or communities.

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[1] 2015 is the reference year for status analysis of forest ownership because information on ownership and management rights for inclusion in the 2020 Forest Resources Assessment (FRA) (FAO, 2020a) was collected for 1990, 2000, 2010 and 2015. Countries submitted their reports in 2018.

Forests in protected areas
For 2020, 11 countries, accounting for 97 percent of the region's forest area, reported a total of 6.8 million ha of forest within protected areas, equivalent to 16.8 percent of the total forest area of the reporting countries. Between 1990 and 2020, forest in protected areas increased in the Sudan, while there was a reported loss of forest cover in the country. This indicates that the forest loss in the Sudan is occurring primarily in forests outside protected areas.

Forests under long-term management plans
For 2020, eight countries, accounting for 93 percent of the NENA region's forest area, reported a total of 12.3 million ha of forest under long-term management plans, equivalent to 31.8 percent of their total forest area. Seven countries (Iraq, the Islamic Republic of Iran, Mauritania, Morocco, Qatar, the Sudan and Tunisia) reported complete time series for this variable for the period 1990–2020. These figures show a 141 percent increase in forest under long-term management plans between 1990 and 2020, indicating that long-term management plans for forest areas are becoming more common. In spite of the positive trend, however, 68.2 percent of the forest area is still without management plans. Figures indicate that forest loss is occurring primarily in forests without long-term management plans.
The subcategory of *forests under long-term management plans within protected areas* was reported on by six countries (Iraq, Mauritania, Morocco, Qatar, the Sudan and Tunisia) that account for 62.5 percent of the NENA region's forest area. For 2020, the six countries report 5 million ha of forests in this subcategory, equivalent to 19.2 percent of the total forest area of the reporting countries. The figure from the Sudan accounts for 95 percent of the total.

Forests under independently verified forest management certification schemes
In 2020 no forest areas in the NENA region were registered as being under an independently verified forest management certification scheme. Morocco is the only country with a historic presence in this category, recording 20 270 ha in 2010.

5. FOREST DISTURBANCE

Reporting on forest disturbance in the NENA region does not allow regional projections to be made. Therefore, only limited data on the categories of disturbance are presented.

Insects
Six countries, accounting for 90.4 percent of the region's forest area in 2015, reported on this variable. With the exception of Morocco and Tunisia, the averages for the reporting period are based on incomplete times series and expert estimates and therefore do not capture variation from year to year. The reported forest area affected by insects in 2015 was 431 000 ha.

Diseases
Four countries, accounting for 71.5 percent of region's forest area, reported on this variable. The strength of the data gives rise to the same concerns as apply to reporting on insects. The reported forest area affected by disease in 2015 was 300 000 ha.

Severe weather events
Four countries, accounting for 47.9 percent of region's forest area, reported on this variable, with all but one reporting zero and the Sudan reporting a yearly estimate of 400 000 ha of forest area affected by weather events in 2015.

Fire
Between 2000 and 2017, ten countries, accounting for 80.7 percent of the region's forest area, reported on forest area affected by fire. The area reported in 2015 was 11 350 ha, equivalent to 0.06 percent of the forest area of the ten countries. Three countries (the Islamic Republic of Iran, Mauritania and Tunisia), accounting for 27.7 percent of the region's forest area, provided complete time series for area burned. Forest accounted for between 0.3 percent and 30.3 percent of the annual area burned in the reporting countries

6. FOREST POLICY AND LEGISLATION

Policies, legislation and regulations are in place in almost all NENA countries with significant forest resources: ten countries report their existence at the national level and eight countries at the subnational level.
Half of the reporting countries, accounting for 48.8 percent of the region's forest area, have platforms that allow stakeholder participation in forest policy development at the national and subnational levels. Traceability systems for wood products are not common.

7. EMPLOYMENT, EDUCATION, NON-WOOD FOREST PRODUCTS AND WOOD REMOVALS

Employment in forestry and logging
Eleven countries, accounting for 96.9 percent of the NENA region's forest area, reported time series on employment in forestry and logging for inclusion in the 2020 Global Forest Resources Assessment (FRA 2020) (FAO, 2020a). Seven of the countries disaggregated the figures by gender. Three countries reported decreases in employment in forestry and logging between 1990 and 2015 while five of the six reporting countries reported an increasing proportion of women in forestry employment during the period 1990–2020. The largest proportion for women's employment in forestry is in the Sudan and is related to gathering non-wood forest products (NWFPs). In FRA 2020, the data reported on employment related to the production of goods derived from forests reflect variations in countries' reporting practices. Some countries (such as the Sudan) include estimates of informal employment and artisanal use while others limit their reporting to formal employment (Algeria). This could be used to indicate areas where further harmonization is needed.
A 2014 FAO Forest Finance Working Paper (Lebedys and Li, 2014) compiled statistics for formal employment in the forestry sector from FAOSTAT and the United Nations Commodity

Trade Statistics Database. The study shows that formal employment in the forestry sector did not experience growth in the NENA region during the period 1990–2011. In 2011, the figure for formal employment in the forestry sector was less than 50 000 full-time equivalent (FTE) for the entire region.

Forest related education

Ten countries, accounting for 92 percent of the region's forest area, reported on forestry related education. A significant rise in the proportion of women graduates occurred, from 18 percent in 1990 to 43 percent in 2015. At the Bachelor's degree level, gender parity was reported, while for advanced university degrees and qualifications at the technician level there are majorities of men (of 74 percent for Doctoral degrees, 62 percent for Master's degrees and 72 percent for technician qualifications). Although gender parity has not yet been reached at all levels of education, the figures indicate that forestry education in the region is moving towards a better gender balance.

Figures reported in FRA 2020 show a generally positive trend in gender equality in forestry related education. It should be noted that FRA does not take the quality of educational programmes into account. A 2015 internal FAO report on strengthening forestry related education and knowledge in the NENA region (Hamid, 2015) points out a number of challenges facing the education and employment opportunities of foresters in the region.

Non-wood forest products

Seven countries, accounting for 93.4 percent of the region's forest area, reported the quantities and values of a variety of NWFPs. The total value of NWFPs reported in 2015 by the seven countries was USD 347.4 million, equivalent to 4.5 percent of the total global value of NWFPs reported for FRA 2020 and indicating the importance of NWFPs in forestry in the region.

At the regional level, plant-based NWFPs account for 74 percent of the total value and animal-based NWFPs for 26 percent. Plant-based raw materials for medicines and aromatic products make up the largest category (38 percent). Edible NWFPs (foods, honey and bushmeat) account for 49 percent of the reported total value. NWFPs play an important role in poverty alleviation and food security.

Several factors contribute to the high degree of uncertainty that is associated with quantifying NWFPs, including the informal nature of NWFP harvesting and consumption, the multitude of products and units of measurement concerned, differences in reporting practices, lack of solid data for reporting purposes, and the fact that NWFPs are often associated with important social and cultural values that cannot be expressed in monetary terms.

Wood removals: According to FAOSTAT (FAO, 2020c), annual removals of wood in the NENA region amount to almost 60 million m^3 – equivalent to about 1.5 percent of the global total. Between 1990 and 2020, annual wood removals in the region increased by 31 percent at an average rate of 341 000 m^3/year (1 percent/year). This annual increase in removals is now tending to slow down.

Average per capita wood removals in NENA is 0.12 m^3/year and ranges widely, from highs in Mauritania with 0.49 m^3/year and the Sudan with 0.39 m^3/year to lows in a number of countries that report less than 0.01 m^3/year. Part of the explanation for high removals in the Sahel is likely household energy and construction needs.

The NENA region is a net importer of wood products. During the period 2012–2019, the value of wood imports was approximately USD 13 billion/year and in 2020 its was nine times as high as the value of exports. Value addition in the forestry sector remained stable over the period 1990–2011.
Assessing the true value added of the forestry sector is difficult because only formal production and trade are registered. NWFPs play a large role and the NWFP subsector is characterized by a high degree of informality. Estimates based on official trade records are therefore likely to capture only part of production and value, although they can help to determine trends in the use of forest resources.

8. CONTRIBUTION OF FORESTRY TO THE SUSTAINABLE DEVELOPMENT GOALS

FRA data are used to monitor progress towards Sustainable Development Goal (SDG) 15 indicator 1.1 and SDG 15.2.1.

SDG 15.1.1 – Forest area as a proportion of total land area
For the NENA region overall, the development trajectory towards the achievement of SDG 15.1.1 is negative. This is owing to a continued net loss of forest area across the region.

SDG 15.2.1.1 – Progress towards sustainable forest management
The status of the individual sub-indicators for the NENA region is as follows:

1. Forest area annual net change – negative. The FRA data for the reporting countries indicate that forest was lost throughout the 30-year period at a slightly increasing rate, from 0.40 percent/year between 1990 and 2000) to 0.56 percent/year between 2015 and 2020.
2. Above-ground biomass in forest (tonnes/ha) – positive. The average growing stock/ha increased slightly between 1990 and 2020. Part of the explanation may be deforestation of areas with low levels of growing stock/ha.
3. Proportion of forest area located within legally established protected areas (2015 forest area baseline) – positive.
4. Proportion of forest area with long-term management plans (2015 forest area baseline) – positive.
5. Forest area under independently verified forest management certification schemes – indeterminable as there is no certified forest in NENA region.

While the SDG indicators and subindicators function well for comparisons at the country level, caution should be applied when applying them at the regional level owing to differences in the underlying country datasets. Data from the Sudan have a particularly large impact owing to the country's large areas and low growing stock.
Subindicator 5 in its current format has limited value as an indicator for the state of sustainable forest management in NENA owing to the lack of forest under market-driven forest management certification schemes in the region.

CHAPTER 1
INTRODUCTION

CHAPTER 1

Introduction

The current report was compiled by the FAO Regional Office for Near East and North Africa (NENA) and is aimed at providing member countries with a source of reliable and timely data on the status of forest resources in the region and supporting them in their evidence-based decision-making and planning for the development of the forestry sector.
Most of the NENA region falls within the subtropical climatic domain, but it spans an area that ranges from a tropical climatic domain in Mauritania, the Sudan and Yemen to a temperate domain in the Islamic Republic of Iran.

Figure 1. Countries in the NENA region

UN Geospatial. 2020. Map of the World. In: *United Nations* [online]. [Cited 18 October 2021]. https://geoservices.un.org/Html5Viewer/index.html?viewer=clearmap modified by author.
Final boundary between the Sudan and South Sudan has not yet been determined

As of 2019, the region is home to 494 million people (UNDESA, 2020; PCBS, 2020a) – 6.4 percent of the global total of 7.7 billion (World Bank, 2020a). The NENA countries differ widely in terms of size and population numbers, economies, degree of electrification and degree of urbanization, as shown in the basic country data in Table 1.

Table 1. Basic country data, NENA region

Country	Total land area ('000 ha)	Population in 2020 ('000 people)	GDP/capita in 2019 (USD)	Rural population 2018 (%)	Fuelwood consumption in 2017 (m^3/capita)	Access to electricity in 2018 (% of population)
Algeria	238 174.00	43 053.05	3 948.30	27	0.0004	100
Bahrain	77.00	1 641.17	23 504.00	11	0.0029	100
Egypt	99 545.00	100 388.07	3 020.00	57	--	100
Iran (Islamic Republic of)	162 876.00	82 913.91	5 520.30	25	0.1004	100
Iraq	43 412.80	39 309.78	5 955.10	29	--	99.9
Jordan	8 878.00	10 101.69	4 330.30	9	0.0072	99.9
Kuwait	1 782.00	4 207.08	32 032.00	0	0.0006	100
Lebanon	1 023.00	6 855.71	7 784.30	11	0.0657	100
Libya	175 954.00	6 777.45	7 683.80	20	0.1001	67
Mauritania	103 070.00	4 525.70	1 677.90	45	0.1868	44.5
Morocco	44 630.00	36 471.77	3 204.10	37	0.0682	100
Oman	30 950.00	4 974.99	15 474.00	15	0.0010	100
Palestine	602.00	4 980.00	3 198.00	--	--	0
Qatar	1 161.00	2 832.07	64 781.70	1	0.0008	100
Saudi Arabia	214 969.00	34 268.53	23 139.80	16	--	100
Sudan	186 665.00	42 813.24	441.50	65	0.1547	59.8
Syrian Arab Republic	18 363.00	17 070.13	2 032.60	45	--	86.0
Tunisia	15 536.00	11 694.72	3 317.50	31	0.2260	99.8
United Arab Emirates	7 102.00	9 770.53	43 103.30	13	--	100
Yemen	52 797.00	29 161.92	968.20	63	--	62
Total	1 407 566.80	493 811.51				
Sources	**FAO, 2020b**	**PCBS, 2020a; World Bank, 2020a**	**PCBS, 2020b; World Bank, 2020b**	**World Bank, 2020c**	**World Bank, 2020a; UN data, 2020**	**World Bank, 2020d**

Together the 20 countries of the region cover 10 percent of the world's land surface, but contain only 1 percent of forests and a mere 0.2 percent of global growing stock. The term "low forest cover countries" is often used to describe countries such as those of the NENA region. Although natural conditions may strongly limit growth, and therefore the production of wood, the forests and other wooded lands of the region are important for a number of reasons: biodiversity conservation, non-wood forest products (NWFPs), protection of soil and water, cultural and social values, and other goods and services. The NENA region is the cradle of many great, ancient civilizations and has a cultural heritage that goes back several millennia. The human impact on forests in the region is therefore not a new phenomenon, as reflected in the limited occurrence of primary forest. With growing populations and diminishing forestry resources at regional level, the pressure is growing.

The region is a biodiversity hotspot with a wealth of endangered endemic species, the preservation of which requires well-balanced, evidence-based sustainable management of natural resources.

Table 2. Land cover in the NENA region, 2020

FRA global class	Area ('000 ha)	% of land area
Forest	41 531	2.95
Other wooded land	33 062	2.35
Other Land	1 332 974	94.70
Total	**1 407 567**	**100**

Adding the effects of climate change to the challenges of preserving the cultural and biological heritage of forest resources in the region, the challenges faced by land-use planners and forest and rangeland managers are massive. The basis for any sustainable resource use is knowledge of the extent and condition of the resource – in this case forests. For the Global Forest Resources Assessment (FRA), the NENA region falls into two main regions – Africa and Asia. The present report provides a compilation of data from FRA 2020 (FAO, 2020a; 2020b) and other sources for the countries of the NENA region.

The arid conditions of the dominant ecological zone in the region (subtropical desert) severely restrict the extent of natural forest cover. A mere 5.2 percent of the land area of the region is covered with forest and other wooded land (OWL).

The quality of the information on forestry resources in the region improved over the three decades from 1990 to 2020. Most of the NENA countries with significant forest resources have conducted one or more national forest inventories (NFIs), but there are still gaps in the knowledge. Forest management data need to be updated regularly in order to provide a timely reflection of conditions on the ground and to capture changes over time. In this connection, three countries are currently conducting NFIs with support from FAO.

FRA 2020 received data from 13 of the countries in the region and conducted desk studies for the remaining seven. The average reference year of the data used to estimate forest cover in 2020 in the NENA region is 2009. FRA 2020 provides the most comprehensive dataset on global forest resources and is based on national datasets that vary in quality depending on the state of knowledge about forest resources in each country.

Publication of the FRA 2020 report provided the opportunity to draw on updated information on the status of forestry resources in the NENA region for the present report. The report is structured in line with the FRA 2020 main report with the following core elements:

- An initial section presents the list of contents, foreword, acknowledgements and a summary of key findings serving as an executive summary.
- Chapter 1 Introduction sets the stage for the document.
- Chapters 2 to 12 present findings based on country submissions to FRA 2020, FAOSTAT figures, World Bank statistics, statistics from the International Standard Industrial Classification of all Economic Activities (ISIC) and a literature review.
- Chapter 13 discusses the findings in light of the quality of the input data.
- Chapter 14 presents conclusions and take-home messages.
- The annexes provide country- and species-specific information on growing stock, NWFPs, ISIC figures for Contribution of forestry sector to Employment and Value Addition and finally a country specific overview of degree of fulfilment of Indicators 15.1.1 and 15.2.1 under Sustainable Development Goal 15 Life on Land.

All the country information in FRA 2020 can be downloaded from the FRA website (FAO, 2020b) in formats that can be analysed in spreadsheets. The FRA main report (FAO, 2020a) also contains a full set of country information in annexes.
The present report provides an overview of the extent, management and uses of forest resources in the NENA region based on the best available and most recent data. The intention is to provide a foundation for informed, evidence-based decision-making related to the development of forest resources in NENA.

FRA data are based on country submissions. However, natural habitats and species distribution, climate change phenomena and outbreaks of pests and disease are cross-boundary, which demonstrates the value of a regional compilation of national figures in providing a bigger picture. This emphasizes the importance of FRA reporting from high-quality data that provide a reliable and timely overview of the current state and development of forest resources in the region.

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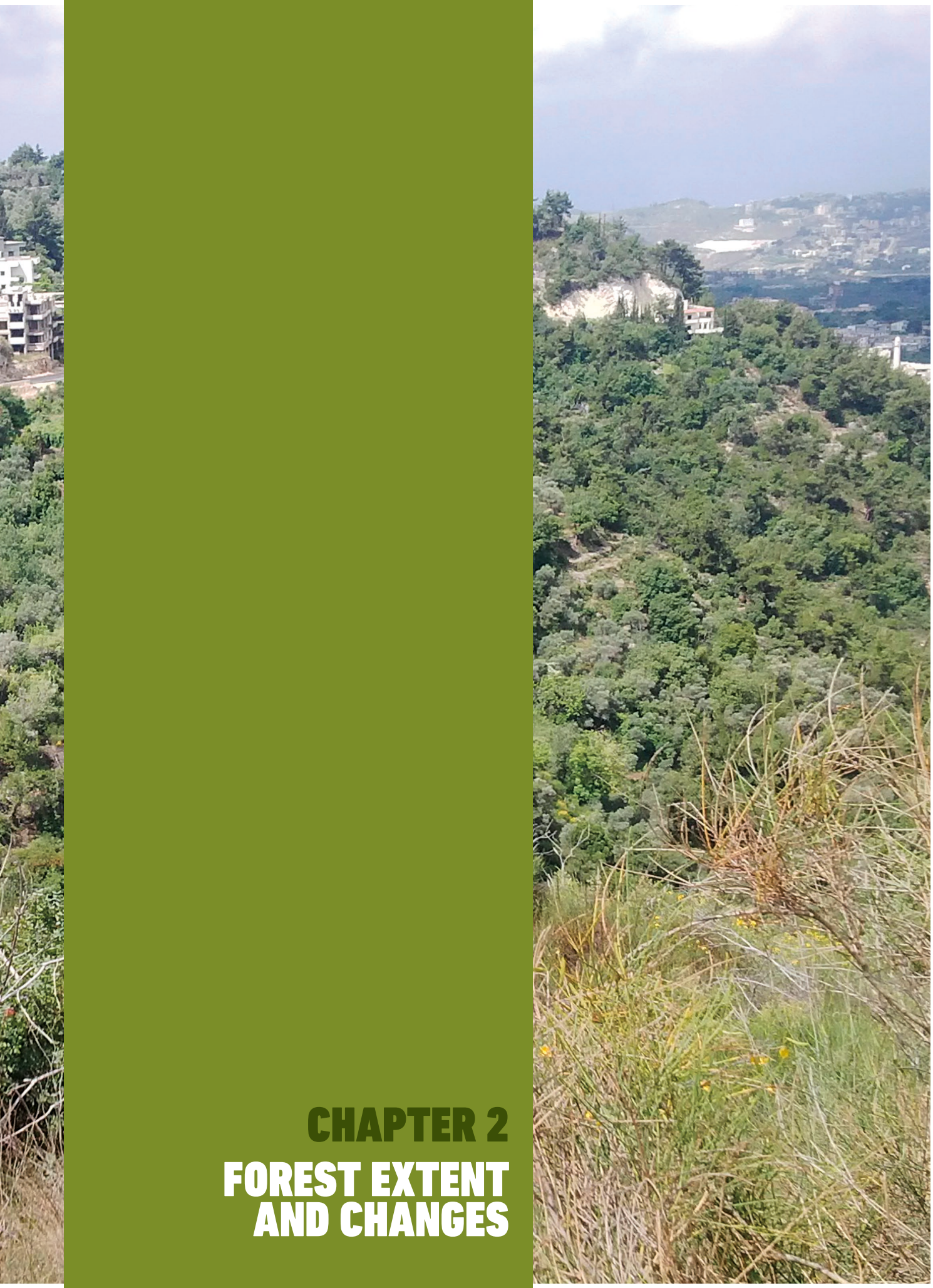


CHAPTER 2
FOREST EXTENT AND CHANGES

CHAPTER 2

Forest extent and changes

2.1 Forest area

The forest area of the NENA region in 2020 is estimated at 41 531 220 ha, which is 2.95 percent of the total land area. Together, the Sudan, the Islamic Republic of Iran and Morocco account for 84 percent of this total. All NENA countries report forest cover of less than 10 percent, except Lebanon (14 percent) and Morocco (12.9 percent). Qatar reports no forest cover at all. Details are shown in Table 3.

Forest – FRA 2020 definition
Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use. (FAO, 2018a)

Table 3. Forest areas of countries, 2020

Country	Forest area 2020 ('000 ha)	% of region's total	Forest area as % of total land area
Algeria	1 949.00	4.69	0.82
Bahrain*	0.70	0.00	0.91
Egypt	44.98	0.11	0.05
Iran (Islamic Republic of)	10 751.87	25.89	6.60
Iraq	825.00	1.99	1.90
Jordan	97.50	0.23	1.10
Kuwait*	6.25	0.02	0.35
Lebanon	143.33	0.35	14.01
Libya*	217.00	0.52	0.12
Mauritania	312.80	0.75	0.30
Morocco	5 742.49	13.83	12.87
Oman	2.50	0.01	0.01
Palestine*	10.14	0.02	1.68
Qatar*	0 00	-	-
Saudi Arabia*	977.00	2.35	0.45
Sudan	18 359.55	44.21	9.84
Syrian Arab Republic	522.08	1.26	2.84
Tunisia	702.73	1.69	4.52
United Arab Emirates*	317.30	0.76	4.47
Yemen	549.00	1.32	1.04
Total	**41 531.22**	**100**	

* Countries where data are based on FRA 2020 desk studies *in lieu* of official figures.

The region shows a high degree of biophysical and socioeconomic differentiation. Fifty percent of the forest area is reported as being in the subtropical domain, 49 percent in the tropical domain (mainly in the Sudan) and 1 percent in the temperate domain (in the Islamic Republic of Iran). Per capita GDP in 2019 ranged from USD 441/capita in the Sudan to USD 64 781/capita in Qatar (World Bank, 2020b).

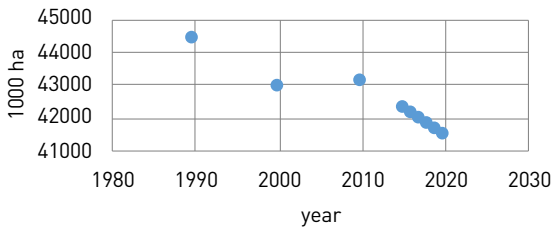
Trends in forested area were established by examining developments over the last three decades (1990–2020) (see Table 4).

Table 4. Forest area by country, 1990–2020

Country	1990 ('000 ha)	2000 ('000 ha)	2010 ('000 ha)	2020 ('000 ha)
Algeria	1 667.0	1 579.0	1 918.0	1 949.0
Bahrain	0.2	0.4	0.5	0.7
Egypt	43.8	59.2	65.6	45.0
Iran (Islamic Republic of)	9 076.1	9 325.7	10 692.0	10 751.9
Iraq	804.0	818.0	825.0	825.0
Jordan	97.5	97.5	97.5	97.5
Kuwait	3.5	4.9	6.3	6.3
Lebanon	139.7	138.2	137.4	143.3
Libya	217.0	217.0	217.0	217.0
Mauritania	476.0	421.6	367.2	312.8
Morocco	5 485.3	5 506.5	5 674.6	5 742.5
Oman	3.0	3.0	3.0	2.5
Palestine	9.1	9.1	10.0	10.1
Qatar	0.0	0.0	0.0	0.0
Saudi Arabia	977.0	977.0	977.0	977.0
Sudan	23 570.3	21 826.2	20 081.2	18 359.6
Syrian Arab Republic	372.1	432.1	492.1	522.1
Tunisia	644.0	667.9	687.4	702.7
United Arab Emirates	245.0	309.4	317.3	317.3
Yemen	549.0	549.0	549.0	549.0
Total	**44 379.5**	**42 941.6**	**43 118.0**	**41 531.2**

At the regional level there has been a 6 percent decline in forest cover over the 30 years from 1990 to 2020,– an average of 0.2 percent per year. However, when looking at the net change of forest cover in each decade, the following figures emerge:
1990–2000: -3.2 percent;
2000–2010: +0.4 percent;
2010–2020: -3.7 percent.

Figure 2. Total forest area in the NENA region, 1990–2020



The apparent small increase in forest area between 2000 and 2010 is likely due to changes in definitions and assessment methodologies at the national level (Saket, 2015) The FRA 2020 dataset for Algeria is an example of how changes in data sources have an effect on the figures reported for areas of forest and OWL. The Algerian area figures for the 1990s and 2000s are based on a 1984 NFI and expert assessment while later figures also use data from the 2003 NFI revised in 2008.
Ten countries, accounting for 68.4 percent of the region's total forest area, provided further breakdowns of the reported net changes in forest area. Table 5 provides an overview of the annual forest expansion, deforestation and net changes reported in FRA 2020.

Table 5. Forest cover change in the NENA region, 1990–2020

FRA category	Area 1990–2000 ('000 ha/year)	Area 2000–2010 ('000 ha/year)	Area 2010–2015 ('000 ha/year)	Area 2015–2020 ('000 ha/year)
Forest expansion (a) of which:	359.68	369.03	173.84	151.58
... afforestation	42.05	26.42	16.2	16.18
... natural expansion	228.38	210.24	98.29	93.92
... cause not stated	89.25	132.37	59.35	41.48
Deforestation (b)	538.61	488.25	338.81	315.35
Forest area net change/year	**-176.58**	**-120.42**	**-162.52**	**-163.82**
Forest area net change/year (%)	**-0.40**	**-0.28**	**-0.54**	**-0.56**

Reporting countries are Algeria, Bahrain, Iraq, Kuwait, Mauritania, Morocco, Qatar, the Sudan, the Syrian Arab Republic and Tunisia.

The conclusion is that for the reporting countries, forest continued to be lost throughout the 30-year period, at a slightly increasing rate, from 0.40 percent per year in 1990–2000 to 0.56 percent between 2015 and 2020.
Fourteen countries (70 percent) reported a constant or increasing forest area in all three decades. Twelve reported a larger forest area in 2020 than in 1990. Only the Sudan, Mauritaniaand Oman, reported a net forest loss between 1990 and 2020.
The NENA region covers 20 countries in different ecological domains and with very different socioeconomic foundations. Opposing trends in land cover changes between countries may therefore cancel each other out and blur national or subregional trends. The Sudan accounts for 44 percent of the forest area of the region, so land-use changes in the Sudan therefore have a large impact on the overall figures.

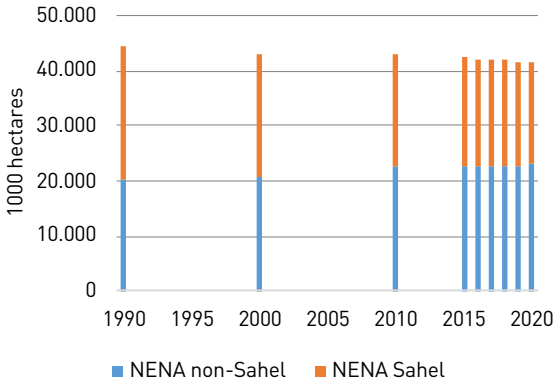
For a more differentiated picture, the regional dataset has been broken down further by looking at the Sahel countries (the Sudan and Mauritania) separately. As well as both being located in the Sahel these two countries share some common features:

- Both have low per capita GDP (World Bank, 2020b) – the Sudan with USD 441/capita has the lowest in the region and Mauritania with USD 1 678 the third lowest.
- Both have experienced a steady loss of forest cover of about 1 percent per annum over the 30-year period.
- Both are strongly dependent on fuelwood for household energy.
- The two countries rank lowest in the region for access to electricity (World Bank, 2020d).

Figure 3 illustrates the forest cover of the NENA region over the three decades 1990–2020 broken down by Sahel and non-Sahel countries.

Throughout the three decades, NENA Sahel lost forest cover at a high rate. While the net area lost remained stable, at between 1 776 and 1 799 ha/year, the rate of loss rose as the forest area declined:
1990–2000: 7.48 percent (0.748 percent/year);
2000–2010: 7.50 percent (0.750percent/year);
2010–2020: 8.69 percent (0.869percent/year).

Figure 3. Forest cover in the NENA region, 1990–2020



This trend is similar to the trend in all of the African continent. The main drivers behind the increasing pressure on the remaining forest resources are conversion of forest to agriculture to feed a growing population, growth of urban areas and infrastructure, harvesting of fuelwood to meet household needs for energy and construction, grazing, and lower productivity in degraded forests.

Net forest cover changes in non-Sahel NENA countries are slightly positive:
1990–2000: 0.18 percent (0.018 percent/year);
2000–2010: 0.95 percent (0.095 percent/year);
2010–2020: 0.84 percent (0.085 percent/year).

2.2 Other wooded land

Trends in area of other wooded land (OWL) in the NENA region over the three decades from 1990 to 2020 are summarized in Table 6.

Other wooded land (OWL) – FRA 2020 definition
Land not classified as "forest", spanning more than 0.5 hectares; with trees higher than 5 meters and a canopy cover of 5-10 percent, or trees able to reach these thresholds *in situ*; or with a combined cover of shrubs, bushes and trees above 10 percent. It does not include land that is predominantly under agricultural or urban land use. (FAO, 2018a)

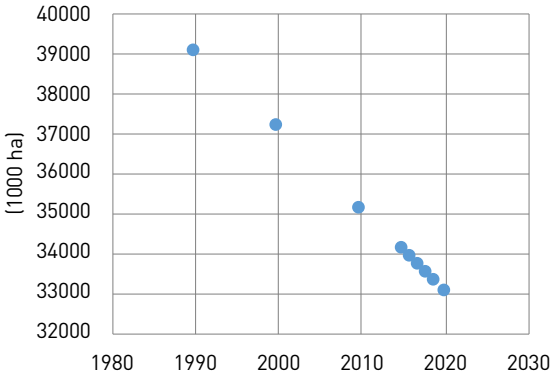
Table 6. Area of other wooded land by country, 1990–2020

Country	1990 ('000 ha)	2000 ('000 ha)	2010 ('000 ha)	2020 ('000 ha)
Algeria	2 063.00	2 374.00	2 457.00	2 590.00
Bahrain	0.09	0.09	0.09	0.09
Egypt	0.00	0.00	0.00	0.00
Iran (Islamic Republic of)	3 627.02	3 627.02	3 627.02	3 627.02
Iraq	259.00	259.00	259.00	259.00
Jordan	51.00	51.00	51.00	51.00
Kuwait	0.00	0.00	0.00	0.00
Lebanon	125.52	124.11	137.09	170.16
Libya	330.00	330.00	330.00	330.00
Mauritania	3 418.02	3 010.27	2 602.51	2 194.79
Morocco	1 431.20	1 399.20	1 298.50	1 223.70
Oman	9.00	9.00	9.00	9.00
Palestine	0.00	0.00	0.00	0.00
Qatar	0.50	0.50	0.50	0.50
Saudi Arabia	959.00	959.00	959.00	959.00
Sudan	25 013.06	23 306.46	21 599.86	19 893.26
Syrian Arab Republic	35.43	35.43	35.43	35.43
Tunisia	326.84	320.49	314.14	307.77
United Arab Emirates	4.10	4.10	4.35	4.85
Yemen	1 406.00	1 406.00	1 406.00	1 406.00
Total	**39 058.78**	**37 215.67**	**35 090.49**	**33 061.57**

At the regional level there has been a 15 percent decline in OWL cover over the 30-year period (Figure 4) with an annual average reduction of 0.5 percent and total losses in each decade of:
1990–2000: 4.7 percent;
2000–2010: 5.7 percent;
2010-2020: 5.8 percent.

The conclusion is that OWL continued to be lost throughout the period at a slightly increasing rate from 0.47 percent/year (in 1990–2000) to 0.58 percent/year (in 2010–2020).

Figure 4. Total area of other wooded land in the NENA region 1990–2020



As was the case for forest cover, countries display various trends in the extent of OWL over the three decades. Fifteen countries (75 percent) reported stable or increasing areas of OWL in all three decades; three reported larger OWL areas in 2020 than in 1990; and four – Morocco, Tunisia, the Sudan and Mauritania – reported net OWL losses between 1990 and 2020. According to FAO (Saket, 2015), the OWL decrease in Tunisia is largely due to reforestation. Conversion to other land uses such as agriculture and settlements can also

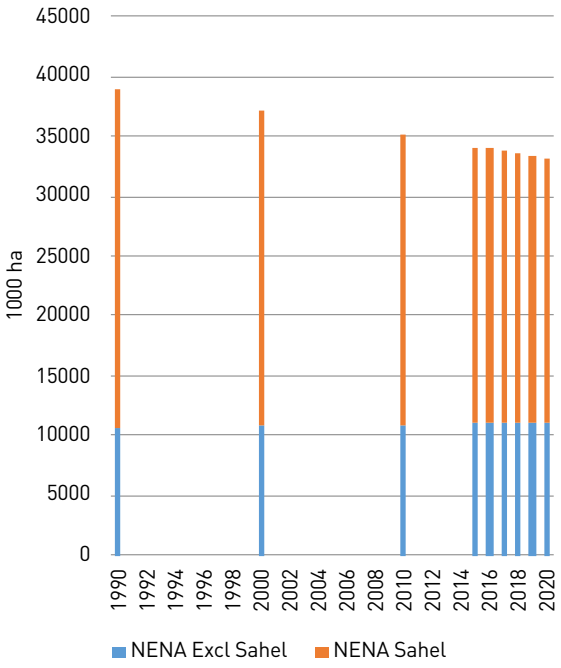
be part of the explanation. FRA 2020 reports that Egypt, Kuwait and Palestine had no OWL throughout the three decades.

The regional dataset for OWL has been broken down further by looking separately at the Sahel countries (Mauritania and the Sudan), which together accounted for two thirds of the OWL in the region in 2020 and for 97 percent of losses of OWL over the three decades 1990 to 2020.

Figure 5 illustrates the OWL cover changes in the region over the three decades 1990–2020 broken down by Sahel and non-Sahel countries.

There has been a large decrease in total OWL areas in the NENA Sahel countries (22.3 percent over the 3 decades or 0.74 percent per annum). The OWL area figures for Mauritania and the Sudan are intra-/extrapolated values based on two points in time (Mauritania 1981–2014, the Sudan 1998–2010), so they are displayed as having equal annual decreases throughout the period.

Figure 5. Other wooded land in the NENA region, 1990–2020



The FRA 2020 country report for the Sudan indicates grazing pressure as having a serious impact on vegetation. The conversion of forests to agriculture and the expansion of settlements are also assumed to have major impact.

The FRA 2020 figures indicate a small increase in total OWL areas in the non-Sahel NENA countries (3.25 percent over the three decades or 0.1 percent per annum). The small net increase in OWL area between 1990 and 2020 shown in Table 6 is the result of increasing OWL areas in Algeria (527 000 ha), Lebanon (45 000 ha) and, to a lesser degree, the United Arab Emirates (750 ha). During the same period, declining areas of OWL were reported by Morocco (-207 500 ha) and Tunisia (-19 070 ha).

Algerian area figures for 1990 and 2000 are based on a 1984 NFI and expert assessment, while the later figures also rely on data from the 2003 NFI revised in 2008. Part of the reason for the increased OWL area is therefore that the 1990 and 2020 figures are based on different surveys of which the most recent captures a larger OWL area. Algeria report declining OWL areas since 2018 owing to reforestation efforts in OWL areas. Reforestation initiatives are likely also part of the reason for declines of OWL in Morocco and Tunisia. The slight increase in OWL observed in non-Sahel NENA countries between 1990 and 2020 is therefore likely a result of changes in the availability data (and improved data) rather than a real increase.

2.3 Other land with tree cover

Other land with tree cover (OLWTC) – FRA 2020 Definition
Land classified as "other land", spanning more than 0.5 hectares with a canopy cover of more than 10 percent of trees able to reach a height of 5 meters at maturity. (FAO, 2018a)

The "other land with tree cover" (OLWTC) category comprises areas found in rural landscapes and urban settings that meet the thresholds for tree cover established by FAO's forest definition, but for which the land use is not forest (and therefore the land does not meet FAO's forest definition). It is a subset of the global FRA class "other land". The OLWTC category is reported on in FRA 2020 because of its importance in the provision of goods and ecosystem services. This is especially the case in countries with low forest cover such as those in the NENA region. OLWTC has four subcategories: palms, tree orchards, agroforestry, and trees in urban settings.

The FRA 2020 data for OLWTC in the NENA region includes submissions from only 11 countries (Algeria, Egypt, the Islamic Republic of Iran, Iraq, Mauritania, Morocco, Oman, the Sudan, the Syrian Arab Republic, Tunisia and Yemen) of which only three provide complete datasets (Morocco, the Syrian Arab Republic and Tunisia). The reported values for the Syrian Arab Republic are zero for all years and categories. For the remaining nine countries no data on OLWTC are reported. Owing to the incomplete datasets, the FRA 2020 results for NENA region do not allow the extraction of regional trends. Table 7 presents the raw figures reported to FRA 2020 and provides only a partial picture of the OLWTC resources of the NENA region.

Table 7. Area of other land with tree cover in the NENA region, 1990–2020

FRA category	1990 ('000 ha)	2000 ('000 ha)	2010 ('000 ha)	2015 ('000 ha)	2020 ('000 ha)
Palms (a)	270.8	402.0	518.0	563.9	568.0
Tree orchards (b)	2 460.2	2 758.8	3 321.5	3 606.4	3 753.7
Agroforestry (c)	509.0	522.8	629.4	656.5	664.3
Trees in urban settings (d)	129.4	154.2	1 187.1	2 469.3	2 743.7
Other (e) *	12.2	12.2	12.2	12.2	12.2
Total (a + b + c + d + e)	**3 381.5**	**3 850.0**	**5 668.2**	**7 308.2**	**7 741.8**
Other land area	**1 324 128.5**	**1 327 409.6**	**1 329 358.3**	**1 331 127.8**	**1 332 974.0**

* "Other" OLWTC reported in the table is 12 200 ha of riparian forest and fallow land reported for Tunisia, which remained constant for all the reporting years.

The large increase in trees in urban areas since 2010 is primarily due to increased availability of data from the Islamic Republic of Iran (since 2010) and Egypt (since 2015). When narrowing the focus to comparable time series from the countries that have reported on the various types of OWLTC it is possible to draw time series for palm and tree orchard areas for a small numbers of countries.

Figure 6 shows the development of palm areas in five countries between 2000 and 2020 and Figure 7 illustrates the development of tree orchard areas in four countries for the same period. As the figures provide OLWTC results for only a small number of countries where data availability allowed the illustration of trends over time the trends shown may not be representative of the NENA region as a whole.

Figure 6. Palm area in five countries, 2000–2020

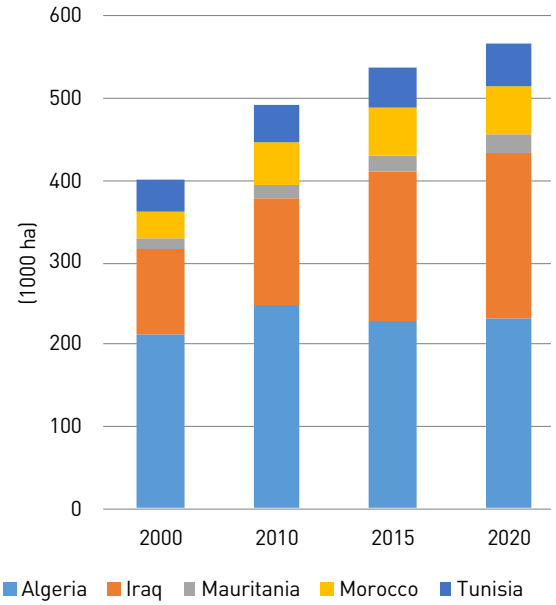
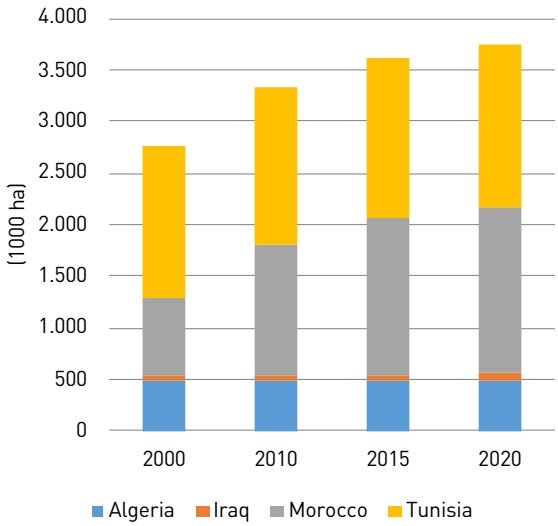


Figure 7. Tree orchard area in four countries, 2000–2020



2.4 Data on forest resources in the region

The level of knowledge on forest resources varies widely in NENA region as summarized in Table 8. Eight countries report having conducted NFIs (Algeria, Islamic Republic of Iran,[1] Lebanon, Mauritania, Morocco, Saudi Arabia,[2] the Sudan and Tunisia). The area data for country reporting is largely based on land cover land-use maps or national statistics and has 2009 as the average refence year.

1 NFI conducted only in the Hyrcanian forest in the north of the country. Area data are from land cover and forest cover maps (https://fra-data.fao.org/IRN/fra2020/extentOfForest/).

2 Partial forest inventory carried out in 1984 on natural forests in Saudi Arabia with the potential for economic exploitation (http://www.fao.org/3/ca9886en/ca9886en.pdf).

Table 8. Status of forest information, by country

Country	Reference years for NFIs	Reference years area data	Comments
Algeria	1984, 2003–2008	1984, 2003, 2006, 2008	2006 ground survey, 2008 NFI revision
Bahrain		1998, 2000	FRA 2020 desk study based on registers/ questionnaires
Egypt		1993, 2004, 2009, 2016 2018	Registers/questionnaires, earlier FRA reports, number of trees planted
Iran (Islamic Republic of)	1990	1990, 2017	1990 partial NFi (Hyrcanian forests) 2019 area and area change assessment (Caspian forests, conducted in 2019)
Iraq		1990, 2005, 2008	Earlier FRA reports, estimates
Jordan		1990, 2000, 2010	Based on agricultural statistics
Kuwait		1996	FRA 2020 desk study utilizing earlier FRA reports
Lebanon	1964, 2005 (2020 NFI in progress)	1998, 2005, 2013	Third NFI conducted 2019–2020
Libya		1990, 2000, 2005	Earlier FRA submissions, estimates
Mauritania	1981	1981, 2014	Land-use land cover maps 1981, 2014
Morocco	1994, 2016	1980–1992, 2003–2013, 2018	1980–1992 first NFI, 2003–2013 second NFI, 2018 area update
Oman		2010	
Palestine		1999, 2001, 2002, 2003, 2004, 2005, 2006, 2011	FRA 2020 desk study based on registers/ questionnaires
Qatar		2005	FRA 2020 desk study based on response to FRA 2005 FAO Forestry Paper No. 157 (on mangroves)
Saudi Arabia	1984	1984, 1994, 2008	FRA 2020 desk study based on 1984 partial NFI, 2008 Sample-based remote sensing assessment
Sudan	2000 (2020 NFI in progress)	1998, 2010	1998 Sudan Land Cover Atlas Africover 2000 first Sudan NFI (Sudan Forest National Cooperation) 2010 Sudan Land Cover Atlas 2020 1st NFI being conducted 2020
Syrian Arab Republic		1992	Earlier FRA report
Tunisia	1990, 2005, 2017 (2020 NFI in progress)	1990, 2005, 2017	1990 first NFI, 2005 second NFI 2017 update of figures from two NFIs 2020 third NFI being conducted
United Arab Emirates		2003, 2005, 2007	FRA 2020 desk study based on registers/ questionnaires, earlier FRA Reports (FRA 2010)
Yemen		**1993**	**1993 sample-based remote sensing assessment**

In 2020 NFIs were in progress in Tunisia, Lebanon and the Sudan with technical support from FAO.

The countries that have conducted two or more NFIs (Algeria, Lebanon Morocco and Tunisia account for a total of 8 537 550 ha of forest and 4 291 630 ha of OWL – 20.5 percent of the NENA region's forest and 13 percent of its OWL.

When countries with an ongoing NFI or with only one NFI (complete or partial) are added, the area covered by at least one NFI increases to 38 938 800 ha of forest (97 percent of the region's total) and 30 965 700 ha of OWL (93.7 percent).
A general trend is that the countries that have conducted one or more NFIs are the ones where forestry plays a prominent role in the resource economy. Chapter 13 provides further discussion on the state of knowledge of forest resources in the NENA region.

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CHAPTER 3
FOREST CHARACTERISTICS

CHAPTER 3

Forest characteristics

FRA 2020 identifies two broad categories of forests: naturally regenerating forests, and planted forests. Naturally regenerating forests generally provide a wider variety of ecosystem goods and services and contribute more to biodiversity conservation than planted forests. Planted forests are typically less biodiverse but can however, when sustainably managed, also provide important ecosystem services and they help reduce harvesting pressure on natural forests.

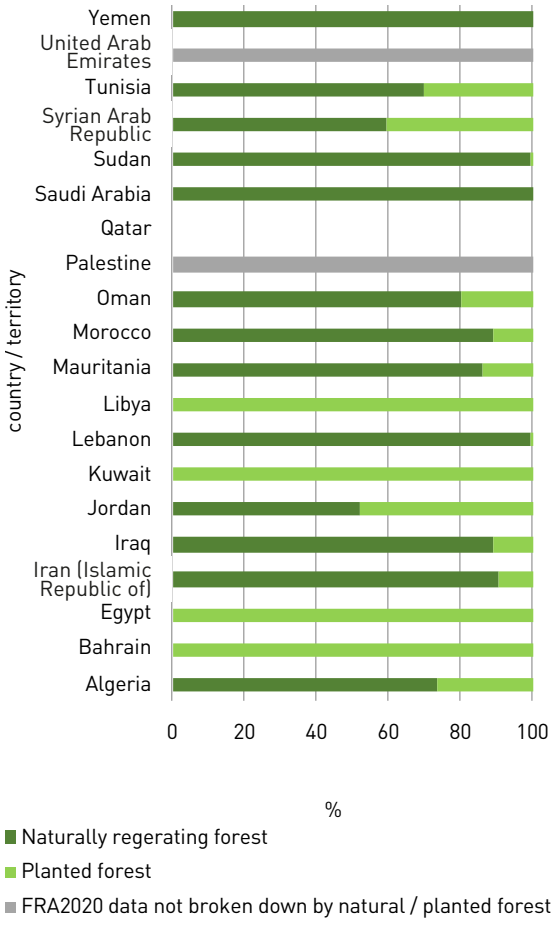
Eighteen countries, accounting for 99.2 percent of the regional forest area, reported on forest characteristics. At the regional level, the proportions of naturally regenerating and planted forests have developed as indicated in Table 9.

Table 9. Proportion of natural forest and planted forest in the NENA region, 1990–2020

Forest status	1990 (%)	2000 (%)	2010 (%)	2020 (%)
Naturally generating forest	95.0	94.4	92.5	91.6
Planted forest	4.4	4.9	6.8	7.6
Status not reported *	0.6	0.7	0.8	0.8
Total	**100.0**	**100.0**	**100.0**	**100.0**

* There are missing figures in the datasets for Palestine and the United Arab Emirates.

Figure 8. Proportion of natural forest and planted forest by country, 2020



The general trend over the last three decades in the NENA region as a whole is that the proportion of naturally regenerating forest is decreasing while the proportion of planted forests increases. This is a result of deforestation occurring mainly in areas of natural forest. The trend is similar to the global development of forest area.

The regional trend covers a variety of country situations. Some countries report only naturally regenerating forests (Saudi Arabia and Yemen). Others report only

planted forests (Bahrain, Egypt, Kuwait and Libya). For two countries (Palestine and the United Arab Emirates) it has not been possible to break down the forest area into the two main categories, and one country (Qatar) reports having no forest at all.
In this chapter, the two main categories – naturally regenerating forests and planted forests – are considered along with some specific subcategories (plantations, mangroves and primary forest).

3.1 Naturally regenerating forest

In 2020, naturally regenerated forest accounted for 93 percent of the world's forest area. For the reporting countries of the NENA region this figure is 92.35 percent. At the regional level the reported area of naturally regenerating forest decreased by 4.1 million ha or 10 percent between 1990 and 2010. The areas reported over the period 1990–2020 are presented in Table 10.

Naturally regenerating forest – FRA 2020 definition

Forest predominantly composed of trees established through natural regeneration. (FAO, 2018a)

Table 10. Area of naturally regenerating forest and annual net change by country, 1990–2020

Country	Area naturally regenerated forest				Annual net change					
	1990 ('000 ha)	2000 ('000 ha)	2010 ('000 ha)	2020 ('000 ha)	1990–2000		2000–2010		2010–2020	
					('000 ha)	(%)	('000 ha)	(%)	('000 ha)	(%)
Algeria	1 334.0	1 234.0	1 420.0	1 439.0	-10.0	-0.75	18.6	1.51	1.9	0.13
Bahrain	0.0	0.0	0.0	0.0	0.0		0.0		0.0	
Egypt	0.0	0.0	0.0	0.0	0.0		0.0		0.0	
Iran (Islamic Republic of)	8 560.4	8 810.0	9 751.0	9 751.0	25.0	0.29	94.1	1.07	0.0	0.00
Iraq	743.2	754.2	758.0	735.2	1.1	0.15	0.4	0.05	-2.3	-0.30
Jordan	50.6	50.6	50.6	50.6	0.0	0.00	0.0	0.00	0.0	0.00
Kuwait	0.0	0.0	0.0	0.0	0.0		0.0		0.0	
Lebanon	138.6	137.6	137.0	142.9	-0.1	-0.07	-0.1	-0.04	0.6	0.43
Libya	0.0	0.0	0.0	0.0	0.0		0.0		0.0	
Mauritania	466.0	400.4	334.8	269.3	-6.6	-1.41	-6.6	-1.64	-6.6	-1.96
Morocco	5 166.9	5 162.2	5 151.5	5 107.6	-0.5	-0.01	-1.1	-0.02	-4.4	-0.09
Oman	2.0	2.0	2.0	2.0	0.0	0.00	0.0	0.00	0.0	0.00
Palestine	--	--	--	--	--	--	--	--	--	--
Qatar	0.0	0.0	0.0	0.0	0.0		0.0		0.0	
Saudi Arabia	977.0	977.0	977.0	977.0	0.0	0.00	0.0	0.00	0.0	0.00
Sudan	23 450.3	21 701.2	19 954.2	18 229.6	-174.9	-0.75	-174.7	-0.81	-172.5	-0.86
Syrian Arab Republic	223.3	259.3	295.7	310.7	3.6	1.61	3.6	1.40	1.5	0.51
Tunisia	491.1	490.7	489.7	488.3	0.0	-0.01	-0.1	-0.02	-0.1	-0.03
United Arab Emirates	--	--	--	--	--	--	--	--	--	--
Yemen	549.0	549.0	549.0	549.0	0.0	0.00	0.0	0.00	0.0	0.00
Total	**42 152.3**	**40 528.1**	**39 870.4**	**38 052.1**	**-162.4**	**-0.39**	**-65.8**	**-0.16**	**-181.8**	**-0.46**
As % of total forest area	**95.53**	**95.09**	**93.18**	**92.35**						

-- = missing data for Palestine and the United Arab Emirates.

The proportion of naturally regenerating forests in the NENA region has declined from 95.53 percent in 1990 to 92.35 percent in 2020. This is likely the combined effect of deforestation occurring mainly in naturally regenerating forests and an increased area of planted forest over the three decades.
When looking at the entire NENA region, the naturally regenerating forests shows a declining trend as shown in Table 11.

Table 11. Annual net area change in naturally regenerating forests in the NENA region, 1990–2020

Decade	Annual net change ('000 ha)	(%)
1990–2000	-162.4	-0.385
2000–2010	-65.8	-0.162
2010–2020	-181.8	-0.478

Five countries report no naturally regenerating forest in 2020: Bahrain, Egypt, Kuwait, Libya and Qatar. Palestine reported 10 140 ha of forest cover, and the United Arab Emirates 317 300 ha in the desk studies conducted by FAO, but the datasets do not provide further breakdown by forest type – natural or planted. The total area of naturally regenerating forest in the NENA region may therefore be larger.

Five countries report decreasing areas of naturally regenerating forest (the Sudan, Mauritania, Iraq, Morocco and Tunisia) while four (Jordan, Oman, Saudi Arabia and Yemen) report stable areas and four (Algeria, the Islamic Republic of Iran, Lebanon and the Syrian Arab Republic) report increasing areas, with the biggest increase being in the Islamic Republic of Iran.

As was the case for the forest cover data in Chapter 2, the impact of the area changes is larger in the NENA Sahel countries than the non-Sahel countries, which justifies looking separately at the NENA Sahel (Mauritania and the Sudan) and the remaining 18 NENA countries.

As shown in Table 12, NENA non-Sahel countries display an overall increase in areas of naturally regenerating forests totalling 1.3 million ha between 1990 and 2020.

Table 12. Annual net area change in naturally regenerating forests, non–Sahel countries, 1990–2020

Decade	Annual net change ('000 ha)	(%)
1990–2000	19.1	0.045
2000–2010	115.5	0.285
2010–2020	-2.8	-0.007

The relatively high figure for the decade 2000–2010 is largely due to an increase in areas of naturally regenerating forest reported for Algeria and the Islamic Republic of Iran. The increased figures for 2000–2010 could partly be influenced by adjustments in measurement methodologies, which capture areas that were previously not included in FRA reporting.

Saudi Arabia and Yemen report 100 percent of their forest areas as naturally regenerating, while Lebanon and the Sudan report 99.7 and 99.3 percent respectively.
NENA Sahel countries (Mauritania and the Sudan) display continuous significant decreases in their areas of naturally regenerating forests in all three decades, with a total loss of 5.4 million ha in naturally regenerating between 1990 and 2020, equivalent to 22.7 percent, as summarized in Table 13.

Table 13. Annual net area change in naturally regenerating forests, Sahel countries, 1990–2020

Decade	Annual net change ('000 ha)	(%)
1990–2000	-181.5	-0.759
2000–2010	-181.3	-0.820
2010–2020	-179.0	-0.882

The rate of decline in naturally regenerating forest in NENA Sahel increased over the three decades and exceeds the average for the African continent (at -0.62 percent per year for the decade 2010–2020).

3.2 Planted forest

In 2020, 7 percent of the world's forest area was made up of planted forest. For the NENA region this figure is 7.65 percent. At the regional level, the area of planted forest increased by 60 percent between 1990 and 2010. The areas reported over the three decades 1990–2020 are presented in Table 14.

Planted forest – FRA 2020 definition
Forest predominantly composed of trees established through planting and/or deliberate seeding.
(FAO, 2018a)

Table 14. Area of planted forest and annual net area change by country, 1990–2020

Country	Area				Annual net change					
	1990 ('000 ha)	2000 ('000 ha)	2010 ('000 ha)	2020 ('000 ha)	1990–2000		2000–2010		2010–2020	
					('000 ha)	(%)	('000 ha)	(%)	('000 ha)	(%)
Algeria	333.00	345.00	498.00	510.00	1.20	0.36	15.30	4.43	1.20	0.24
Bahrain	0.22	0.37	0.52	0.70	0.02	6.82	0.02	4.05	0.02	3.46
Egypt	43.81	59.21	65.64	44.98	1.54	3.52	0.64	1.09	-2.07	-3.15
Iran (Islamic Republic of)	515.67	515.67	941.00	1 000.89	0.00	0.00	42.53	8.25	5.99	0.64
Iraq	60.77	63.81	67.00	89.79	0.30	0.50	0.32	0.50	2.28	3.40
Jordan	46.90	46.90	46.90	46.90	0.00	0.00	0.00	0.00	0.00	0.00
Kuwait	3.45	4.29	4.85	6.25	0.08	2.43	0.06	1.31	0.14	2.89
Lebanon	1.11	0.59	0.34	0.35	-0.05	-4.68	-0.03	-4.24	0.00	0.29
Libya	217.00	217.00	217.00	217.00	0.00	0.00	0.00	0.00	0.00	0.00
Mauritania	10.07	21.25	32.43	43.57	1.12	11.10	1.12	5.26	1.11	3.44
Morocco	318.40	344.30	523.10	634.60	2.59	0.81	17.88	5.19	11.15	2.13

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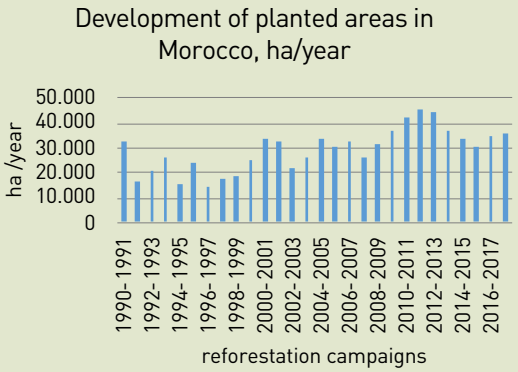
Country	Area				Annual net change					
	1990 ('000 ha)	2000 ('000 ha)	2010 ('000 ha)	2020 ('000 ha)	1990–2000		2000–2010		2010–2020	
					('000 ha)	(%)	('000 ha)	(%)	('000 ha)	(%)
Oman	1.00	1.00	1.00	0.50	0.00	0.00	0.00	0.00	-0.05	-5.00
Palestine	--	--	--	--	--	--	--	--	--	--
Qatar	0.00	0.00	0.00	0.00	0.00		0.00		0.00	
Saudi Arabia	0.00	0.00	0.00	0.00	0.00		0.00		0.00	
Sudan	120.00	125.00	127.00	130.00	0.50	0.42	0.20	0.16	0.30	0.24
Syrian Arab Republic	148.80	172.80	196.40	211.40	2.40	1.61	2.36	1.37	1.50	0.76
Tunisia	152.92	177.20	197.72	214.48	2.43	1.59	2.05	1.16	1.68	0.85
United Arab Emirates	--	--	--	--	--	--	--	--	--	--
Yemen	0.00	0.00	0.00	0.00	0.00		0.00		0.00	
Total	**1 973.12**	**2 094.39**	**2 918.90**	**3 151.41**	**12.13**	**0.61**	**82.45**	**3.94**	**23.25**	**0.80**
As % of total forest area	**4.47**	**4.91**	**6.82**	**7.65**						

-- = missing data for Palestine and the United Arab Emirates.

The proportion of area of planted forests in relation to total forest area in the NENA region increased from 4.47 percent in 1990 to 7.65 percent in 2020. This is likely the combined effect of deforestation occurring mainly in naturally regenerating forests and of the increased area of planted forest over the three decades.

Box 1. Reforestation in Morocco

Morocco has a long history of reforestation and has achieved great progress through concerted efforts over time. During the 1970s, Morocco formulated a national reforestation plan, providing guidelines for reforestation and creating great impetus for reforestation towards 2000, focusing mainly on introduced species.



In 1997, the next phase of the reconstitution of forest ecosystems began with adoption of the Reforestation Master Plan. The master plan defines major areas for reforestation in the country and was incorporated into the National Forest Programme in 1998, with reforestation integrated as a strategic axis of sustainable forest management, with a focus on indigenous species.

This caused a further increase in the areas planted, from an average of 20 000 ha/year to more than 36 000 ha/year by the middle of the 2010–2020 decade, as indicated in the figure above.

The described focused national effort in re- and afforestation is the explanation for the increase in the area of planted forest for Morocco reported to FRA 2020 for the period 1990-2020. (Département des Eaux et Forêts, 2020)

In 2020, the Islamic Republic of Iran, Morocco and Algeria had the largest areas of planted forests (see Box 1). The relatively large annual increases in planted forest area reported for the decade 2000–2010 are due to large increases in the areas of planted forest reported for Morocco, the Islamic Republic of Iran and Algeria. The NENA countries can be divided into the following four groups with regards to their FRA 2020 reporting of planted forest:

- *No planted forest area reported*: Three countries (Qatar, Saudi Arabia and Yemen) report no planted forest. With the exception of Yemen the datasets are based on desk studies conducted by FAO. In those studies, Palestine reported 10 140 ha of forest, and the United Arab Emirates 317300 ha, but the datasets do not provide further breakdown by forest type – natural or planted. The total area of planted forest in the NENA region may therefore be higher than reported.
- *No changes in the area of planted forest reported for 1990–2010*: Two countries (Jordan and Libya) report no changes in their areas of planted forest over the three decades.
- *Increases in the area of planted forest reported*: Ten countries (Algeria, Bahrain, Iraq, the Islamic Republic of Iran, Kuwait, Mauritania, Morocco, the Sudan, the Syrian Arab Republic and Tunisia) report increasing areas of planted forest throughout the three decades 1990–2020.
- *Decreases in the area of planted forest reported*: Three countries (Egypt, Lebanon and Oman) report declines of the areas of planted forest between 1990 and 2020:
  - Egypt reports increases in planted forest area during the first two decades, followed by a decline of about a third during the last decade.
  - The area of planted forest in Lebanon was reduced by 46.8 percent during the first decade and by a further 42.4 percent during the second decade. During the last decade the area appears to have increased slightly. This trend is explained by conflict during the first decade, which hampered afforestation, and the use of estimated data for the first two decades. The spike in afforestation during the third decade is the effect of the National Afforestation and Reforestation Programme launched in 2012 (Director of Rural Development and Rural Development of Lebanon, personal communication, 2020).
  - In Oman, the negative change occurred during the last decade, when the area of planted forest decreased by 50 percent.

When considering trends it should be borne in mind that the underlying data sources are sometimes weak and the area of planted forests in some NENA countries is small. Even small variations in reported area can therefore cause a large percentage variations.

3.3 Plantation forest and other planted forest

In 2020, 45 percent of the world's planted forest area was made up of plantation forest. For the NENA region this figure is 76.45 percent. The areas of plantation forest reported in the region over the three decades 1990–2020 are presented in Table 15.

Plantation forest – FRA 2020 definition
Planted forest that is intensively managed and meet all the following criteria at planting and stand maturity: one or two species, even age class, and regular spacing. (FAO, 2018a)

Table 15. Area of plantation forest and annual net changes by country, 1990–2020

Country	Area				Annual net change					
	1990 ('000 ha)	2000 ('000 ha)	2010 ('000 ha)	2020 ('000 ha)	1990–2000		2000–2010		2010–2020	
					('000 ha)	(%)	('000 ha)	(%)	('000 ha)	(%)
Algeria	0.00	0.00	0.00	0.00	0.00		0.00		0.00	
Bahrain	0.22	0.37	0.52	0.70	0.02	6.82	0.02	4.05	0.02	3.46
Egypt	0.00	0.00	0.00	0.00	0.00		0.00		0.00	
Iran (Islamic Republic of)	515.67	515.67	941.00	'000.89	0.00	0.00	42.53	8.25	5.99	0.64
Iraq	60.77	63.81	67.00	89.79	0.30	0.50	0.32	0.50	2.28	3.40
Jordan	46.90	46.90	46.90	46.90	0.00	0.00	0.00	0.00	0.00	0.00
Kuwait	3.45	4.29	4.85	6.25	0.08	2.43	0.06	1.31	0.14	2.89
Lebanon	0.00	0.00	0.00	0.00	0.00		0.00		0.00	
Libya	217.00	217.00	217.00	217.00	0.00	0.00	0.00	0.00	0.00	0.00
Mauritania	0.00	0.00	0.00	0.00	0.00		0.00		0.00	
Morocco	318.40	344.30	523.10	634.60	2.59	0.81	17.88	5.19	11.15	2.13
Oman	0.00	0.00	0.00	0.00	0.00		0.00		0.00	
Palestine	--	--	--	--	--	--	--	--	--	--
Qatar	0.00	0.00	0.00	0.00	0.00		0.00		0.00	
Saudi Arabia	0.00	0.00	0.00	0.00	0.00		0.00		0.00	
Sudan	120.00	125.00	127.00	130.00	0.50	0.42	0.20	0.16	0.30	0.24
Syrian Arab Republic	148.80	172.80	196.40	211.40	2.40	1.61	2.36	1.37	1.50	0.76
Tunisia	50.49	58.64	65.68	71.58	0.82	1.61	0.70	1.20	0.59	0.90
United Arab Emirates	--	--	--	--	--	--	--	--	--	--
Yemen	0.00	0.00	0.00	0.00	0.00		0.00		0.00	
Total	**1 481.70**	**1 548.78**	**2 189.45**	**2 409.11**	**6.71**	**0.45**	**64.07**	**4.14**	**21.97**	**1.00**
As % of total planted forest area	**75.09**	**73.95**	**75.01**	**76.45**						

-- = missing data for Palestine and the United Arab Emirates.

As a proportion of planted forests in the NENA region, plantation forests have remained somewhat stable over the three decades, with a tendency for slight increases (1.44 percent) over the most recent decade, 2010–2020. NENA countries can be divided into the following groups with regards to their FRA 2020 reporting on plantation forests:

- *No plantation forest area reported*: Eight countries (Algeria, Egypt, Oman, Lebanon, Mauritania, Qatar, Saudi Arabia and Yemen) report no plantation forest during the three decades. Palestine reported 10 140 ha of forest cover and the United Arab Emirates 317 300 ha in the desk studies conducted by FAO, but the datasets do not provide further breakdown by forest type. The total area of plantation forest in the NENA region may therefore be higher.
- *No net changes in the area of plantation forest reported for 1990–2010*: Two countries (Jordan and Libya) report no changes in their areas of plantation forest over the three decades.
- *Increases in the area of plantation forest reported*: Eight countries (Bahrain, Iraq, the Islamic Republic of Iran, Kuwait, Morocco, the Sudan, the Syrian Arab Republic and Tunisia) show increasing areas of planted forest throughout the three decades 1990–2020.

The Islamic Republic of Iran, Libya, Morocco and the Syrian Arab Republic reported the largest plantation areas in 2020. As was the case for area of planted forest reported in section 3.2, the decade 2000–2010 shows relatively large annual increases in plantation forests. These are due to a large increase in plantation areas reported for Morocco and the Islamic Republic of Iran in that decade.
In Bahrain, Kuwait and Libya, plantation forest is the only forest category reported on for the three decades.

3.4 Plantations of introduced species

In 2020, 1.4 percent of the world's forest area was made up of plantation forest of introduced species. For the NENA region this figure is 2.3 percent. Fourteen countries in the region, accounting for 27.3 percent of the 2020 regional forest area, reported on this variable, as shown in Table 16.

Table 16. Area of plantation forest of introduced species and annual net change by country, 1990–2020

Country	Area				Annual net change					
	1990 ('000 ha)	2000 ('000 ha)	2010 ('000 ha)	2020 ('000 ha)	1990–2000		2000–2010		2010–2020	
					('000 ha)	(%)	('000 ha)	(%)	('000 ha)	(%)
Algeria	0.00	0.00	0.00	0.00	0.00		0.00		0.00	
Bahrain	0.00	0.00	0.00	0.00	0.00		0.00		0.00	
Egypt	0.00	0.00	0.00	0.00	0.00		0.00		0.00	
Iran (Islamic Republic of)	--	--	--	--	--	--	--	--	--	--
Iraq	0.00	0.00	0.00	0.00	0.00		0.00		0.00	
Jordan	0.00	0.00	0.00	0.00	0.00		0.00		0.00	
Kuwait	3.45	4.29	4.85	6.25	0.08	2.43	0.06	1.31	0.14	2.89
Lebanon	0.00	0.00	0.00	0.00	0.00		0.00		0.00	
Libya	--	--	--	--	--	--	--	--	--	--
Mauritania	0.00	0.00	0.00	0.00	0.00		0.00		0.00	
Morocco	218.43	201.19	205.56	206.20	-1.72	-0.79	0.44	0.22	0.06	0.03
Oman	0.00	0.00	0.00	0.00	0.00		0.00		0.00	
Palestine	--	--	--	--	--	--	--	--	--	--
Qatar	0.00	0.00	0.00	0.00	0.00		0.00		0.00	
Saudi Arabia	0.00	0.00	0.00	0.00	0.00		0.00		0.00	
Sudan	--	--	--	--	--	--	--	--	--	--
Syrian Arab Republic	--	--	--	--	--	--	--	--	--	--
Tunisia	35.06	40.80	45.84	50.19	0.57	1.64	0.50	1.24	0.43	0.95
United Arab Emirates	--	--	--	--	--	--	--	--	--	--
Yemen	0.00	0.00	0.00	0.00	0.00		0.00		0.00	
Total	256.94	246.28	256.25	262.64	-1.07	-0.41	1.00	0.40	0.64	0.25
As % of planted forest area	**26.44**	**23.15**	**17.83**	**16.50**						
As % of plantation forest area	**53.59**	**47.52**	**36.19**	**30.91**						

-- = missing data for the Islamic Republic of Iran, Libya, Palestine, the Sudan, the Syrian Arab Republic and the United Arab Emirates.

The general trend is that the proportion of planted forest and plantation forest made up of introduced species is declining over the three decades. Tunisia and Kuwait report increasing proportions of plantation forest with introduced species. The FRA 2020 report for Tunisia mentions *Pinus pinea*, *Eucalyptus* sp. and *Acacia* sp. as introduced forest plantation species. Morocco experienced a decrease in the area of plantations with introduced species during the first decade (1990–2000), after which there has been a small increase.
The same considerations concerning the availability of data and the size of the areas mentioned in previous sections apply. The countries reporting on plantations of introduced species account for only 27.3 percent of the total regional forest area. When areas are small, even small changes may cause significant deviations in terms of percentages.

3.5 Primary forest

FRA 2020 reported a global average of 34 percent of the forests in reporting countries being primary forests. For the NENA region this figure is 4.5 percent. Thirteen countries, accounting for 99 percent of the region's forest area, reported on this variable, of which only three reported the presence of primary forest during the three decades 1990–2020, as shown in Table 17.

Primary forest – FRA 2020 definition
Primary forests are naturally regenerated forests of native tree species, where there are no clearly visible indications of human activities and ecological processes are not significantly disturbed.
(FAO, 2018a)

Table 17. Area of primary forest and change by country, 1990–2020

Country	1990 ('000 ha)	2000 ('000 ha)	2010 ('000 ha)	2020 ('000 ha)	Change 1990–2020 ('000 ha)	Primary forest as % of total forest			
						1990	2000	2010	2020
Algeria	0	0	0	0	0	0	0	0	0
Bahrain	--	--	--	--	--	--	--	--	--
Egypt	--	--	--	--	--	--	--	--	--
Iran (Islamic Republic of)	200	200	200	200	0	2.20	2.14	1.87	1.86
Iraq	0	0	0	0	0	0	0	0	0
Jordan	0	0	0	0	0	0	0	0	0
Kuwait	--	--	--	--	--	--	--	--	--
Lebanon	--	--	--	--	--	--	--	--	--
Libya	--	--	--	--	--	--	--	--	--
Mauritania	0	0	0	0	0	0	0	0	0
Morocco	0	0	0	0	0	0	0	0	0
Oman	--	--	--	--	--	--	--	--	--
Palestine	--	--	--	--	--	--	--	--	--
Qatar	0	0	0	0	0	0	0	0	0
Saudi Arabia	360	360	360	360	0	36.85	36.85	36.85	36.85
Sudan	1 649.92	1 527.83	1 405.74	1 283.65	-366.27	7.00	7.00	7.00	6.99

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Country	1990 ('000 ha)	2000 ('000 ha)	2010 ('000 ha)	2020 ('000 ha)	Change 1990–2020 ('000 ha)	Primary forest as % of total forest			
Syrian Arab Republic	0	0	0	0	0	0	0	0	0
Tunisia	0	0	0	0	0	0	0	0	0
United Arab Emirates	0	0	0	0	0	0	0	0	0
Yemen	0	0	0	0	0	0	0	0	0
Total	**2 209.92**	**2 087.83**	**1 965.74**	**1 843.65**	**-366.27**				
As % of total forest area	**5.03**	**4.91**	**4.61**	**4.49**					

-- = missing data for Bahrain, Egypt, Kuwait, Lebanon, Libya, Oman and Palestine.

The Islamic Republic of Iran and Saudi Arabia report constant areas of primary forest, of 200 000 ha and 360 000 ha respectively, while the Sudan reports an annual loss of primary forest over the three decades, of 122 090 ha/year. The overall result for the region is therefore declines in the reported area of primary forest and in the proportion of total forest area that it accounts for. It is likely that only a very small proportion of forests in the region can be classified as primary forests owing to the low forest cover and the presence of human settlements since ancient times. The FRA 2020 data however do not support detailed analysis. In terms of biodiversity, primary forest areas are important and their disappearance could ultimately lead to significant losses in forest biodiversity. The NENA region is home to important biodiversity hotspots, which would justify further work on locating and managing the remaining areas of primary forest.

3.6 Mangroves

FRA 2020 reports separately on bamboo plantations, rubber plantations and mangroves. Of these categories, only mangroves occur in the NENA region, so they are the only category included in this report. At the global level, mangroves have been decreasing over the three decades 1990–2020, but at a declining rate. The rate of decline in the most recent decade (2010–2020) is less than half that of the first decade (1990–2000). Mangroves fulfil important environmental and socio-economic functions, help to protect coastlines and are able to sequester large carbon pools, mainly in the soil. Eighteen countries accounting for 99.98 percent of the regional forest area reported on this variable. Table 18 presents the FRA 2020 data on mangrove forests in the NENA region.

Mangroves – FRA 2020 definition
Mangroves are assemblages of salt-tolerant shrubs and trees that grow in intertidal regions of tropical, subtropical and some temperate coastlines.
(FAO, 2018a)

Table 18. Area of mangrove forest and annual net change by country, 1990-2020

Country	Area				Annual net change					
	1990 ('000 ha)	2000 ('000 ha)	2010 ('000 ha)	2020 ('000 ha)	1990–2000		2000–2010		2010–2020	
					('000 ha)	(%)	('000 ha)	(%)	('000 ha)	(%)
Algeria	0	0	0	0	0.00		0.00		0.00	
Country	**Area**				**Annual net change**					
	1990 ('000 ha)	2000 ('000 ha)	2010 ('000 ha)	2020 ('000 ha)	1990–2000		2000–2010		2010–2020	
					('000 ha)	(%)	('000 ha)	(%)	('000 ha)	(%)
Bahrain	0.09	0.09	0.09	0.09	0.00	0.00	0.00	0.00	0.00	0.00
Egypt	0.39	0.39	0.39	0.5	0.00	0.00	0.00	0.00	0.01	2.82
Iran (Islamic Republic of)	25.76	25.76	25.76	19.23	0.00	0.00	0.00	0.00	-0.65	-2.53
Iraq	0	0	0	0	0.00		0.00		0.00	
Jordan	0	0	0	0	0.00		0.00		0.00	
Kuwait	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Lebanon	0	0	0	0	0.00		0.00		0.00	
Libya	0	0	0	0	0.00		0.00		0.00	
Mauritania	0.3	0.2	0.2	0.22	-0.01	-3.33	0.00	0.00	0.00	1.00
Morocco	0	0	0	0	0.00		0.00		0.00	
Oman	1	1	1	1	0.00	0.00	0.00	0.00	0.00	0.00
Palestine	--	--	--	--	--	--	--	--	--	--
Qatar	--	--	--	--	--	--	--	--	--	--
Saudi Arabia	158	158	158	158	0.00	0.00	0.00	0.00	0.00	0.00
Sudan	33	30	31	30	-0.30	-0.91	0.10	0.33	-0.10	-0.32
Syrian Arab Republic	0	0	0	0	0.00		0.00		0.00	
Tunisia	0	0	0	0	0.00		0.00		0.00	
United Arab Emirates	3.8	4	4.3	4.3	0.02	0.53	0.03	0.75	0.00	0.00
Yemen	0.95	0.9	0.9	0.9	0.00	-0.53	0.00	0.00	0.00	0.00
Total	**223.30**	**220.35**	**221.65**	**214.25**	**-0.30**	**-0.13**	**0.13**	**0.06**	**-0.74**	**-0.33**
As % of total forest area	**0.50**	**0.51**	**0.51**	**0.52**						

-- = missing data for Qatar and Palestine.

According to the FRA 2020 report a total of 9 050 ha of mangroves were lost in the NENA region between 1990 and 2020. For the region as a whole, the annual changes in mangrove forest area over the three decades were as follows:

1990–2000: annual net change -300 ha (-0.132 percent);
2000–2010: annual net change +130 ha (+0.059 percent);
2010–2020, annual net change -740 ha (-0.334 percent).

The mangroves in NENA do not follow the global trend for mangrove decline in the 1990–2020 period, but rather they display fluctuating rates of loss during the three decades.

A loss of 1.32 percent was observed during the first decade (1990–2000), followed by a small increase in 2000–2010 and then a large loss of 7 400 ha or 3.3 percent between 2010 and 2020. This high rate of loss is due mainly to the figures reported for the Islamic Republic of

Iran and the Sudan. The picture is similar to the trend in forests discussed in Section 2.1 and is likely owing to changes in definitions and assessment methodologies at the national level.

Mangrove forests in the NENA region as a proportion of total forest area have remained stable at about 0.5 percent over the three decades, indicating that the rate of mangrove loss in the region is similar to the rate of forest loss (Section 2.1).
Three countries account for 97 percent of the mangroves in the region: Saudi Arabia with 74 percent, the Sudan with 14 percent and the Islamic Republic of Iran with 9 percent. The remaining 3 percent is distributed among seven countries. The NENA countries can be divided into the following groups with regards to their FRA 2020 reporting on mangroves:

- *No figures for mangroves submitted*: Two countries (Palestine and Qatar) did not submit figures for mangroves.
- *No mangrove forest area reported*: Eight countries (Algeria, Iraq, Jordan, Lebanon, Libya, Morocco, the Syrian Arab Republic and Tunisia) report no mangrove forest over the three decades.
- *No net changes in area of mangrove forest reported for 1990–2010*: Four countries (Bahrain, Kuwait, Oman and Saudi Arabia) report no changes in their areas of mangrove forest over the three decades.
- *Increases in area of mangrove forest reported*: Two countries (Egypt and the United Arab Emirates) report increasing areas of mangrove forest throughout the three decades 1990–2020.
- *Decreases in net area of mangrove forest reported*: Four countries (the Islamic Republic of Iran, Mauritania, the Sudan and Yemen) report decreasing areas of mangrove forest throughout the three decades.

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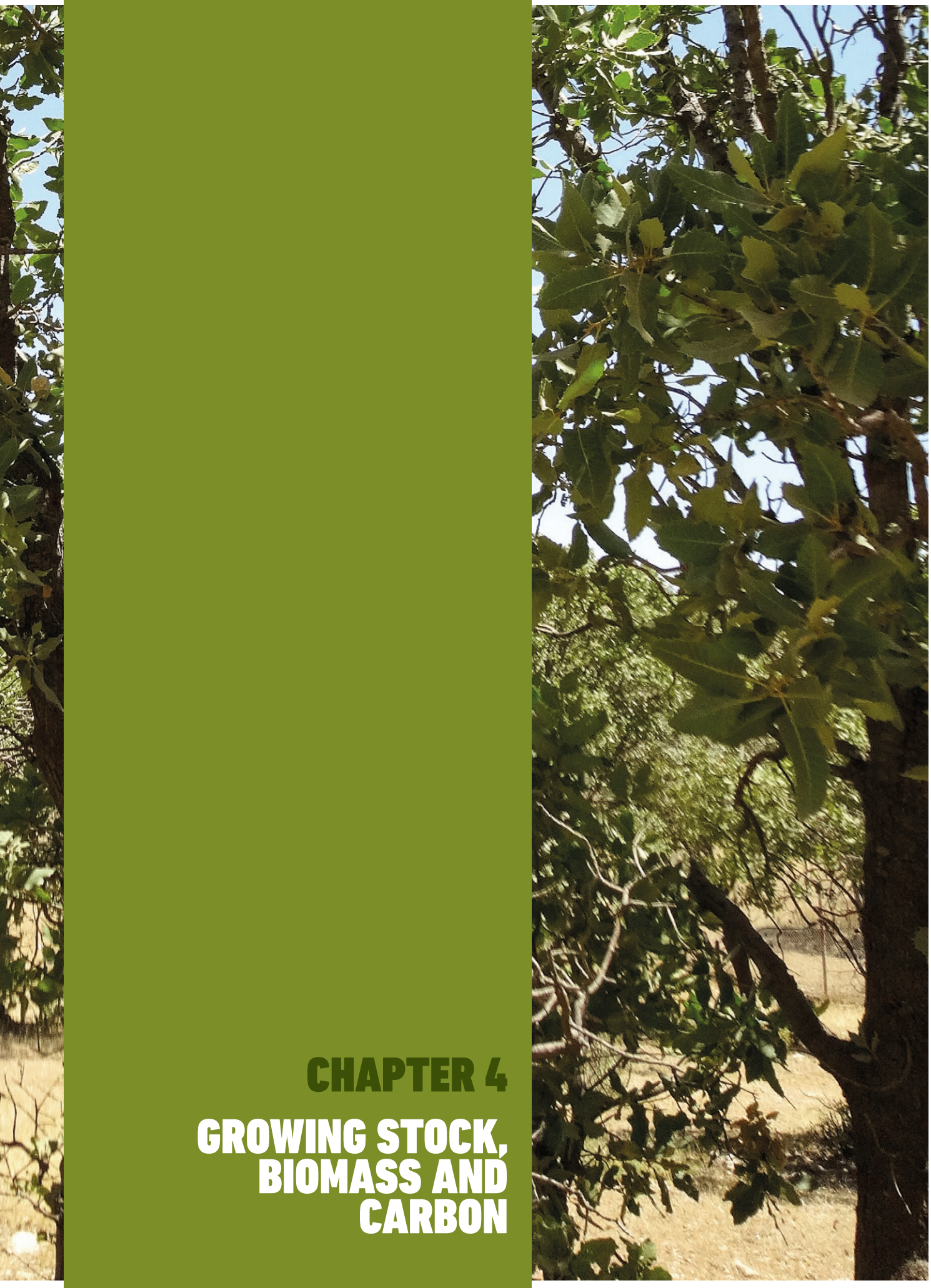


CHAPTER 4

GROWING STOCK, BIOMASS AND CARBON

CHAPTER 4

Growing stock, biomass and carbon

4.1 Growing stock

FRA 2020 estimates the world's forest growing stock in 2020 at 557 billion m^3. In comparison, the total growing stock reported for the forests in the NENA region is 1.2 billion m^3, equivalent to 0.2 percent of the global total. The area covered by forest in the NENA region was 41.5 million ha (2.95 percent of the land area) in 2020. Forest growing stock comprises two main categories: naturally regenerated forests, and planted forests. These are in addition to the growing stock in other wooded land (OWL). Total growing stock is the sum of "total forest growing stock" and "total OWL growing stock". To allow annual calculations of biomass and carbon for reporting on SDG 15, total growing stock has been reported annually since 2015.

Growing stock – FRA 2020 definition
Volume over bark of all living trees with a minimum diameter of 10 cm at breast height (or above buttress if these are higher). Includes the stem from ground level up to a top diameter of 0 cm, excluding branches.
(FAO, 2018a)

Forest growing stock

Globally, a slight decline in the total forest growing stock was reported between 1990 and 2020. The reduction is characterized by a loss in forest area – at a decreasing rate from the first decade (1990–2000) to the third (2010–2020) – and an increase in average growing stock per hectare over the same period.

In the NENA region, a slight overall increase in forest growing stock is reported for the 1990–2020 period (of 0.9 percent over the three decades, or 0.03 percent/year). The increase is a result of a decrease during the first decade (1990–2010), followed by an increase in the second decade (2000–2010) and another decrease during the third (2010–2020).

Natural forests make up 95 percent of the reported growing stock in the NENA region, while planted forests account for 5 percent. The area and growing stock of natural forests have declined over the 30-year reporting period while the area and growing stock of planted forests have increased. Seventeen countries, accounting for 99.96 percent of the region's total forest area, reported figures for forest growing stock, shown in Table 19.

Table 19. Forest growing stock and annual change by country, 1990–2020

Country	Growing stock (million m³ over bark)				Annual change					
					1990–2000		2000–2010		2010–2020	
	1990	2000	2010	2020	(million m³)	(%)	(million m³)	(%)	(million m³)	(%)
Algeria	74.31	70.45	85.75	87.14	-0.39	-0.52	1.53	2.17	0.14	0.16
Bahrain	--	--	--	--	--	--	--	--	--	--
Egypt	5.26	7.11	7.88	5.4	0.19	3.52	0.08	1.08	-0.25	-3.15
Iran (Islamic Republic of)*	404.65	406.49	469.22	469.22	0.18	0.05	6.27	1.54	0.00	0.00
Iraq	29.75	30.27	30.53	30.53	0.05	0.17	0.03	0.09	0.00	0.00
Jordan	2.93	2.93	2.93	2.93	0.00	0.00	0.00	0.00	0.00	0.00
Kuwait	--	--	--	--	--	--	--	--	--	--
Lebanon	4.98	4.92	4.9	5.11	-0.01	-0.12	0.00	-0.04	0.02	0.43
Libya	7.87	7.87	7.87	7.87	0.00		0.00		0.00	
Mauritania	9.72	8.86	7.99	8.75	-0.09	-0.88	-0.09	-0.98	0.08	0.95
Morocco	128.96	142.43	150.22	153.41	1.35	1.04	0.78	0.55	0.32	0.21
Oman	0.14	0.14	0.14	0.13	0.00	0.00	0.00	0.00	0.00	-0.71
Palestine	--	--	--	--	--	--	--	--	--	--
Qatar	0	0	0	0	0.00		0.00		0.00	
Saudi Arabia	8.21	8.21	8.21	8.21	0.00	0.00	0.00	0.00	0.00	0.00
Sudan	471.41	436.52	401.62	367.19	-3.49	-0.74	-3.49	-0.80	-3.44	-0.86
Syrian Arab Republic	11.18	12.98	14.79	15.69	0.18	1.61	0.18	1.39	0.09	0.61
Tunisia	17.23	20.3	23.02	21.95	0.31	1.78	0.27	1.34	-0.11	-0.46
United Arab Emirates	11.98	15.17	15.52	15.8	0.32		0.04		0.03	
Yemen	5.05	5.05	5.05	5.05	0.00	0.00	0.00	0.00	0.00	0.00
Total	**1 193.63**	**1 179.7**	**1 235.64**	**1 204.38**	**-1.39**	**-0.12**	**5.59**	**0.47**	**-3.13**	**-0.25**

-- Missing data on growing stock. Figures for the Islamic Republic of Iran cover only naturally regenerating forests, which constitute more than 90 percent of the country's total forest area. Growing stock/ha for planted forest was not reported to FRA 2020. The actual growing stock of the Islamic Republic of Iran will therefore be higher than shown in the table.

Forest growing stock in the NENA region is very unevenly distributed among and within countries. The three countries with the largest forest growing stock (the Islamic Republic of Iran, the Sudan and Morocco) account for 82 percent of the total, and 98 percent of the total is found in the ten countries shown in Table 20, while the remaining 2 percent is distributed among the remaining ten countries.

The overall trend in forest growing stock over the three decades (decrease, increase, decrease) bears some similarity to the regional trend in forest cover discussed in Section 2.1 and is likely partly due to changes

Table 20. Top ten countries for forest growing stock in the NENA region, 2020

Country	Forest growing stock	
	(million m³)	% of total
Iran (Islamic Republic of	469.22	39
Sudan	367.19	30
Morocco	153.41	13
Algeria	87.14	7
Iraq	30.53	3
Tunisia	21.95	2
United Arab Emirates	15.80	1
Syrian Arab Republic	15.69	1
Mauritania	8.75	1
Saudi Arabia	8.21	1

in definitions and assessment methodologies for determining forest area at the national level. The trend for the region as a whole is summarized in Table 21.

Table 21. Change in forest growing stock in the NENA region, 1990–2020

Decade	Change/decade		Change/year	
	(million m³)	(%)	(million m³)	(%)
1990–2000	-13.93	-1.17	-1.39	-0.12
2000–2010	55.94	4.74	5.59	0.47
2010–2020	-31.26	-2.53	-3.13	-0.25
Total (1990–2020)	**10.75**	**0.90**	**0.36**	**0.03**

The NENA regional forest growing stock is described in 20 national datasets that have developed in different ways over the last three decades as shown in Table 22, which can be summarized as follows:

- *Declines in forest growing stocks* between 1990 and 2020 are reported by the Sudan, Mauritania and Oman. This is due to the decreasing areas of forest reported over the period (Section 2.1.).
- *Constant growing stocks* over the three decades are reported by Jordan, Libya, Saudi Arabia and Yemen.
- *No growing stock* owing to having no forest area is reported by Qatar.
- *Increases in forest growing stock* are reported by the remaining nine countries in Table 22.
- *No data on growing stock*: The datasets for Bahrain, Kuwait and Palestine originate from FAO desk studies and do not include data on growing stock.

Table 22. Change in forest growing stock by reporting country, 1990–2020

Change (million m³)	(%)	Country
64.57	15.96	Iran (Islamic Republic of)
24.45	18.96	Morocco
12.83	17.27	Algeria
4.72	27.39	Tunisia
4.51	40.34	Syrian Arab Republic
3.82	31.89	United Arab Emirates
0.78	2.62	Iraq
0.14	2.66	Egypt
0.13	2.61	Lebanon
0	0	Jordan, Libya, Qatar, Saudi Arabia, Yemen
-0.01	-7.14	Oman
-0.97	-9.98	Mauritania
-104.22	-22.11	Sudan

Missing data on forest growing stock for Bahrain, Kuwait and Palestine.

The total forest growing stock of a country is the sum of the products from areas of a given forest type (in ha) multiplied by the stocking levels (in m^3/ha). Growing stock is therefore affected by changes in forest area and changes in the forest density.

Changes in forest area were discussed in Section 2.1. The current section focuses on the reported growing stocks (in m^3/ha) and their changes. For detailed data at the country level please refer to Annex 1 or the FRA datasets available online.[1] The main characteristics and trends for the NENA region are discussed by forest type in the following subsections.

Naturally regenerating forests

Fifteen countries, accounting for 98.67 percent of the forest area of the NENA region, reported variable growing stock in naturally regenerating forests. Naturally regenerating forests account for 1 116.3 million m^3, equivalent to 93 percent of the total reported forest growing stock in the region, of 38 million ha. The average growing stock per hectare for naturally regenerated forest across the region is 29.3 m^3/ha. For country-specific data please see Annex 1a or FAO, 2020b.

Table 23. Change in total growing stock in naturally regenerating forest in the NENA region, 1990–2020

Decade (million m^3)	Total change		Annual changes	
	(%)	(million m^3)	(%)	
1990–2000	-25.28	-2.2	-2.53	-0.22
2000–2010	40.14	3.6	4.01	0.36
2010–2020	-35.44	-3.1	3.54	-0.31
Total (1990–2020)	**-20.58**	**-1.8**	**-0.69**	**-0.06**

FRA 2020 datasets for Bahrain, Kuwait, Libya, Palestine and the United Arab Emirates do not report on growing stocks of naturally generating forests. Libya reported that there is no naturally regenerating forest in the country, while the other four country submissions are based on FAO desk studies.

The three countries with the highest reported total growing stocks of naturally regenerating forest are the Islamic Republic of Iran (with 9.6 million ha of naturally regenerating forest area and 469.22 million m^3 of growing stock), the Sudan (with 18.2 million ha and 365.59 million m^3) and Morocco (with 5.1 million ha and 138.42 million m^3). These three countries account for 87 percent of the total growing stock and 87 percent of the total area of naturally regenerating forest in the region.

[1] Available at https://fra-data.fao.org/.

The figures for growing stock per hectare in naturally regenerating forest range from 8.4 m^3/ha in Saudi Arabia to 55.1m^3/ha in Oman. These stocking levels are indicative of the range of sparse forest vegetation in the NENA region.
This wide variation in the growing stock reported by countries reflects in part different growth conditions but also various levels of knowledge about the condition and extent of national forest resources. Only those countries that have conducted one or more NFIs (the Islamic Republic of Iran, Mauritania, Morocco and Tunisia) reported a more differentiated picture in which the growing stock per hectare has different values between 1990 and 2020. At the other end of the spectrum, the constant figures for growing stock reported by some countries over the three decades indicate that the data used is not regularly updated.

Planted forests

14 countries, accounting for 72.78 percent of the forest area of NENA region reported on the variable growing stock for planted forests. Planted forests account for 64.2 million m^3, equivalent to 5 percent of the reported forest growing stock of the NENA region and covering 1.9 million ha. The weighted average growing stock per hectare for Planted forest across NENA region is 33.3 m^3/ha.
For country specific data please see Annex 1b or FAO2020b.

Table 24. Change in total growing stock in planted forest in the NENA region, 1990–2020

Decade (million m^3)	Total change		Annual change	
	(%)	(million m^3)	(%)	
1990–2000	8.10	22.0	0.81	2.20
2000–2010	15.46	34.5	1.55	3.45
2010–2020	3.85	6.4	0.39	0.64
Total (1990–2020)	**27.41**	**74.6**	**0.91**	**2.49**

Source: Based on data extracts from FRA 2020.

As shown in Annex 1, FRA 2020 datasets for Bahrain, the Islamic Republic of Iran, Kuwait, Libya, Palestine and the United Arab Emirates do not report on growing stocks of planted forests. The datasets for Bahrain, Qatar, Palestine, Kuwait, Saudi Arabia and the United Arab Emirates originate from FAO desk studies.

Four countries reported on areas of planted forest over the reporting period, but not on growing stock in planted forest: Bahrain (with 700 ha of planted forest in 2020), Kuwait (6 250 ha), Libya (217 000 ha) and the Islamic Republic of Iran (1 000 890 ha).The figures for planted forest in the NENA region shown in Table 24 do not include figures from these four countries because of missing data for growing stock per hectare. As a result, the total

area not included in the table is 1.2 million ha, representing 38 percent of the region's total planted forest area.

Even when average figures for planted forest growing stock are included for the missing 1.2 million ha, planted forests make up less than 10 percent of the total forest area and the total growing stock at the regional level.

The datasets for four countries (Bahrain, Kuwait, Egypt and Libya) indicate that all forest is planted, while Saudi Arabia and Yemen report that all their forest area is naturally regenerating. The other reporting countries show a mix of natural and planted forest, but naturally regenerating forest is always the dominant component. For country-specific data please see Annex 1 or FAO, 2020b.

The five countries with the highest reported total growing stocks in planted forest are Algeria (with 23.61 million ha), Morocco (14.86 million ha), the Syrian Arab Republic (6.35 million ha), Egypt (5.4 million ha)and Tunisia (4.83 million ha). Together, these countries account for 51 percent of the region's planted forest area. For country-specific data please see Annex 1 or FAO, 2020b.

The figures for growing stock per hectare in planted forest reported by countries range from 20 m^3/ha in the Sudan to 120 m^3/ha in Egypt. Only Morocco and Tunisia reported varying values for growing stock per hectare over the reporting period, while the reported growing stocks for the remaining nine countries remained constant.

Plantation forests

Thirteen countries, accounting for 70.80 percent of the region's total forest area, reported variable growing stock in plantation forests. Plantation forests account for 2.3 percent (27.5 million m^3) of the total reported forest growing stock in the NENA region (1.2 billion m^3) and cover 1.1 million ha. The average reported growing stock per hectare for plantation forest across the region is 25.1 m^3/ha. For country-specific data please see Annex 1c or FAO, 2020b.

Table 25. Change in total growing stock in plantation forest in the NENA region, 1990–2020

Decade (million m^3)	Total change		Annual change	
	(%)	(million m^3)	(%)	
1990–2000	4.24	33.8	0.42	3.38
2000–2010	6.14	36.6	0.61	3.66
2010–2020	4.57	19.9	0.46	1.99
Total (1990–2020)	**14.95**	**119.2**	**0.50**	**3.97**

Source: Based on data extracts from FRA 2020.

In 2020, 76 percent of the planted forest area in the NENA region was made up of plantations (Table 15). Plantations are located mainly in eight countries Iraq, the Islamic Republic of Iran, Jordan, Kuwait, Libya, Morocco, the Sudan, and the Syrian Arab Republic (where all planted forests are reported as plantations).

Annex 1c provides the reported figures for 2020 of growing stock per hectare in plantation forests in NENA countries. The figures range from 20 m^3/ha in the Sudan to 31.56 m^3/ha in Tunisia. Countries that reported values for area of plantations (Table 15) and growing stock per hectare for plantations (Annex 1c) – the Sudan, the Syrian Arab Republic, Jordan, Morocco and Tunisia – account for only 45 percent of the total area of plantation in the region, while growing stock per hectare was not reported for the remaining 55 percent. The current section can present only what has been reported to the FRA 2020 by these countries.

It is, however, safe to say that the total growing stock in plantation forests is significantly larger than the figures reported, and that a more complete assessment would be possible if more complete data were submitted.

Other wooded land

Seven countries, accounting for 79.4 percent of the total OWL area in the NENA region, reported variable growing stock for OWL. The reported total for the region is 87.9 million m^3, which is equivalent to 7.3 percent of the total reported forest growing stock (1.2 billion m^3). The area covered by OWL in 2020 in the region was 33 million ha (2.35 percent of the total land area). The reported average growing stock for OWL across the region is 3.3 m^3/ha. For country-specific data please see Annex 1e or FAO, 2020b.

Table 26. Change in total growing stock in other wooded land in the NENA region, 1990–2020

Decade (million m^3)	Total change		Annual change	
	(%)	(million m^3)	(%)	
1990–2000	-6.78	-6.3	-0.68	-0.63
2000–2010	-7.22	-7.2	-0.72	-0.72
2010–2020	-5.77	-6.2	-0.58	-0.62
Total (1990–2020)	**-19.78**	**-18.4**	**-0.66**	**-0.61**

Source: Based on data extracts from FRA 2020.

As shown in Table 6, in 2020, OWL covered 33 million ha in the NENA region (equivalent to 2.35 percent of the total land area). The general trend over the 30-year reporting period is for a steady decline in the growing stock of OWL driven mainly by land-use changes in the Sudan.

OWL growing stock in the NENA region: Table 27 shows the total OWL growing stock in the seven reporting countries, calculated using the data on OWL area in Table 6 and the data on growing stock in Annex 1e. The Sudan alone accounts for 60 percent of the NENA OWL area and 68 percent of the reported growing stock.

The remaining 13 countries that are not shown in Table 27 account for 21 percent of the OWL area but did not report on growing stock per hectare. The situation is similar to that of plantations, discussed in the previous subsection, where a number of countries reported on area but not on growing stock.

Table 27. Other wooded land growing stock in the NENA region, 2020

Country	OWL growing stock	
	(million m³)	% of total
Sudan	59.67	67.87
Yemen	11.95	13.59
Algeria	9.58	10.90
Saudi Arabia	4.80	5.45
Morocco	1.04	1.18
Lebanon	0.86	0.98
Oman	0.0225	0.03

The reported FRA 2020 figures for growing stock per hectare for OWL shown in Annex 1e range (by a factor 10) from 0.85 m³/ha in Morocco to 8.5 m³/ha in Tunisia, with a weighted average of 3.3 m³/ha. It would therefore be speculative to guess how large the unreported growing stock of OWL is, but it would be safe to say that the total OWL growing stock is larger than the datasets provided to FRA 2020 owing to missing data for 21 percent of the OWL area.

4.2 Growing stock composition

Ten countries reported to FRA 2020 on the composition of their growing stock, listing the ten species with the largest growing stocks. Two of these countries (Oman and Saudi Arabia) also ranked the species, while the other eight (Algeria, the Islamic Republic of Iran, Lebanon, Libya, Mauritania, Morocco, the Sudan and Tunisia) reported growing stock by species or genus. Together the countries account for 93 percent (1 120 million m³) of the reported growing stock in the NENA region (1 204 million m³). For a full list of reported growing stock by species please see Annex 2 or the FRA 2020 data portal.[2]

The species reported can be grouped into three main categories:

- temperate zone species reported from Islamic Republic of Iran;
- Mediterranean zone species reported from Algeria, Lebanon, Libya, Morocco and Tunisia;
- Sahel zone species reported from Mauritania and the Sudan.

Table 28 shows the top 20 species and genera, which together account for two-thirds of the reported growing stock of the NENA region.

[2] Available at https://fra-data.fao.org/DZA/assessment/FRA 2020/growingStock/.

Table 28. Top 20 species of growing stock in the NENA region

	Species	Growing stock (m^3/ha)	% of total	Country
1	*Fagus orientalis*	154.4	13.8	Iran (Islamic Republic of)
2	*Carpinus betulus*	150	13.4	Iran (Islamic Republic of)
3	*Pinus halepensis*	74.97	6.7	Algeria, Morocco, Tunisia
4	*Quercus rotundifolia*	61.05	5.5	Morocco, Algeria
5	*Alnus* sp.	36.7	3.3	Iran (Islamic Republic of)
6	*Acer* sp.	31.5	2.8	Iran (Islamic Republic of)
7	*Quercus castaneafolia*	30.2	2.7	Iran (Islamic Republic of)
8	*Cedrus atlantica* (Endl.)	25.17	2.2	Morocco
9	*Balanités aegyptiaca*	24.69	2.2	Sudan, Mauritania
10	*Pavotia persica*	23	2.1	Iran (Islamic Republic of)
11	*Albizia amara*	18.2	1.6	Sudan
12	*Argania spinosa* (L.) Skeels	18.82	1.7	Morocco
13	*Combretum* sp.	15.35	1.4	Sudan
14	*Anogeissus leiocarpus*	15.08	1.3	Sudan, Mauritania
15	*Diospyros lotus*	13.8	1.2	Iran (Islamic Republic of)
16	*Eucalyptus* sp.	13.58	1.2	Morocco, Libya, Algeria, Tunisia
17	*Quercus suber* L.	12.48	1.1	Morocco, Tunisia
18	*Acacia seyal*	10.2	0.9	Sudan, Mauritania
19	*Juniperus* sp.	9.49	0.8	Morocco
20	*Tillia* sp.	9.2	0.8	Iran (Islamic Republic of)
% of total growing stock			66.8	

Much reporting to FRA 2020 is at the genus level, which means that the data cannot be fully broken down to individual species. The data do however give some valuable indications:

- The large growing stock in the Islamic Republic of Iran and its distribution among the most important temperate species and genera is reflected in the data. The Islamic Republic of Iran accounts for 60 percent of the growing stock of the top 20 species.
- *Pinus*, *Quercus*, *Cedrus* and planted *Eucalyptus* forest are the most important species and genera in the Mediterranean zone in terms of growing stock.
- *Balanites*, *Combretum*, *Albizia*, *Anogeissus* and *Acacia* spp. are reported from Mauritania and the Sudan. The diversity of the vegetation of the Sahel countries is reflected in the fact that the ten species reported make up less than half the growing stock. The remainder is covered by "remaining native species".
- It is noteworthy that there is only one introduced species or genus (*Eucalyptus* sp.) in the top 20, accounting for 1.2 percent of the reported growing stock. The others are native species and genera. This is a positive trend in building the adaptation capacity of forest ecosystems to climate change in the region.
- Countries that have not conducted an NFI were not able to provide quantitative data on the species breakdown of their forest growing stocks.

4.3 Biomass stock

Forest biomass stock comprises above-ground biomass (AGB), below-ground biomass (BGB) and dead wood. To allow annual calculations of biomass and carbon for reporting on the SDGs, biomass stock has been reported on annually since 2015.

Biomass in tonne per hectare ha is derived from the stocking level (m^3/ha) and the forest area that is converted through biomass conversion and expansion factors. For countries that do not have national data specifically on forest biomass and carbon, the growing stock figures have been converted to biomass using default values for the main ecological domains from the Intergovernmental Panel on Climate Change (IPCC) (FAO, 2018b).

Biomass data for Bahrain, Kuwait and Palestine were derived from desk studies conducted by FAO as these countrie did not report on forest growing stock per hectare and therefore also not on forest biomass.

The remaining 17 countries reported on AGB and BGB. The ratio of BGB to AGB ranges from 1:2.33 in Yemen to 1:4.93 in Libya with a median of 3.51. In the case of Qatar, zero values were reported for AGB and BGB owing to the absence of forest vegetation. Figure 9 illustrates the reported forest biomass per hectare by country for 2020.

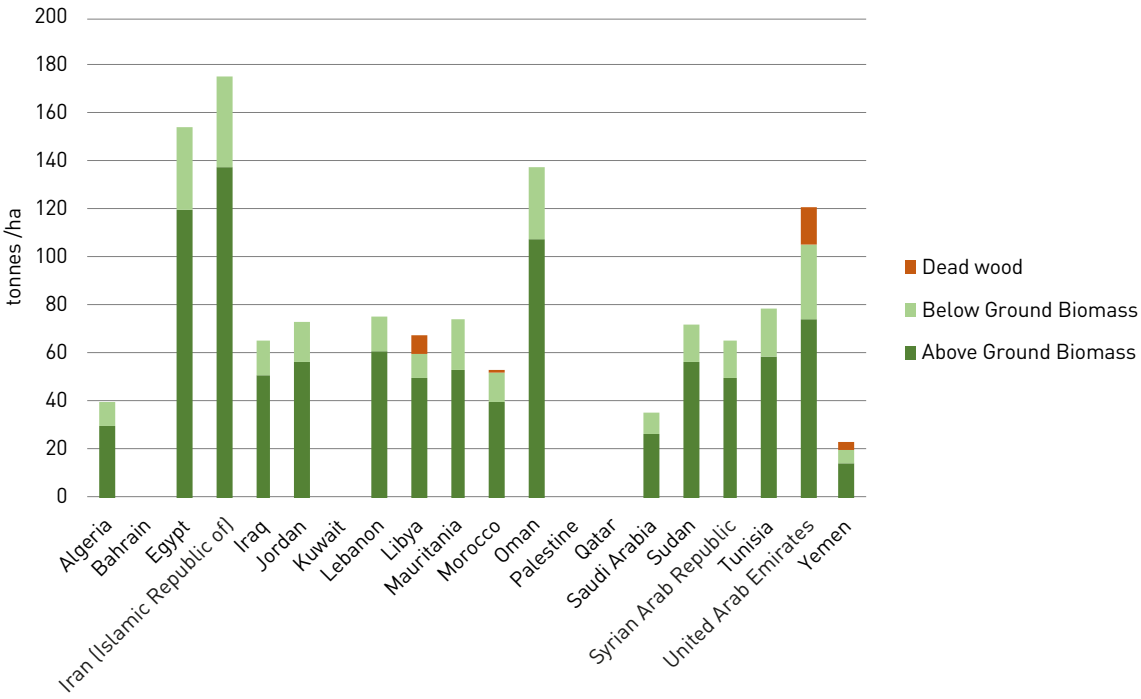
Biomass – FRA 2020 definitions

Above-ground biomass: All biomass of living vegetation, both woody and herbaceous, above the soil including stems, stumps, branches, bark, seeds, and foliage.

Below-ground biomass: All biomass of live roots. Fine roots of less than 2 mm diameter are excluded because these often cannot be distinguished empirically from soil organic matter or litter.

Dead wood: All non-living woody biomass not contained in the litter, either standing, lying on the ground, or in the soil. Dead wood includes wood lying on the surface, dead roots, and stumps larger than or equal to 10 cm in diameter or any other diameter used by the country. (FAO, 2018a)

Figure 9. Forest biomass by country, 2020



Trends over time are illustrated in Figure 10. The sums of AGB plus BGB in reporting countries in the NENA region range from 20.00 tonnes/ha in Yemen to 175.83 tonnes/ha in the Islamic Republic of Iran. The optional parameter "dead wood" was reported on by for countries: Libya, Morocco, the United Arab Emirates and Yemen. For comparability reasons these figures are not included in Figure 10.

Figure 10. Forest living biomass (above- and below-ground) by country, 1990–2020

Over the 30-year reporting period, Iraq reported a 3.6 percent decline in AGB plus BGB per hectare (hereafter referred to as living forest biomass/ha), equivalent to 0.12 percent/year. The United Arab Emirates reported a decline of 0.4 percent over the same period, equivalent to 0.01 percent per year. Egypt, Jordan, Libya, Saudi Arabia, the Sudan, the Syrian Arab Republic and Yemen reported no changes over the three decades. The remaining seven countries all reported increases in living forest biomass/ha between 1990 and 2020, with most noticeable increases in Mauritania (36.8 percent), Morocco (19.7 percent) and Tunisia (18.9 percent).

4.4 Carbon stock

Forest carbon status 2020

FRA 2020 provides countries with the possibility of reporting on all five forest carbon pools:

1. above-ground biomass;
2. below-ground biomass;
3. dead wood;
4. litter;
5. soil carbon.

For FRA 2020, 17 NENA countries reported on biomass stocks from which the AGB and BGB carbon pools (carbon in living biomass) are derived. Three countries – Bahrain, Kuwait and Palestine – are covered by FAO desk studies because they did not report on growing stock and consequently not on living biomass carbon stock. Based on the 17 country reports, the living biomass carbon stock of the NENA region in 2020 is estimated at 1.827 billion tonnes, equivalent to an average of 44 tonnes of carbon/ha.

In addition to carbon in living biomass:

- Libya, Morocco, the United Arab Emirates and Yemen reported on carbon pools of dead wood and litter, averaging 3.26 tonnes of carbon/ha;
- Algeria, Morocco, Saudi Arabia and Yemen reported on soil carbon pools, averaging 27.28 tonnes of carbon/ha.

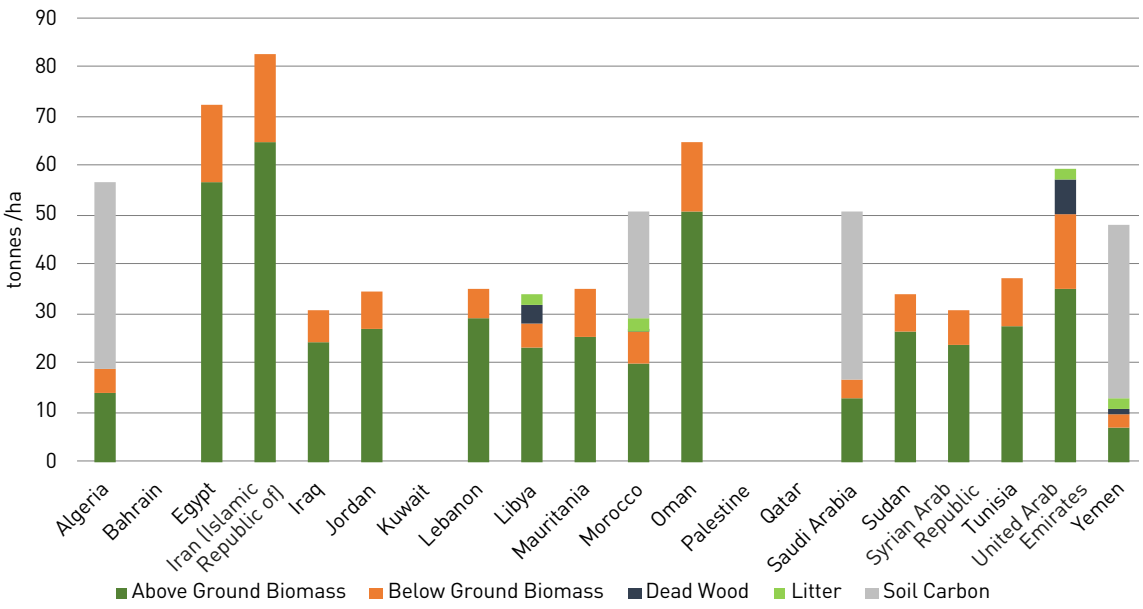
The overall results for forest carbon stocks in NENA countries are shown in Table 29 and Figure 11.

Table 29. Forest carbon stock in carbon pools by country, 2020

Country	Carbon in living biomass		Carbon in dead wood and litter		Carbon in soil		Total carbon	
	(million tonnes)	(tonnes /ha)	(million tonnes)	(tonnes /ha)	(million tonnes)	(tonnes /ha)	(million tonnes)	(tonnes /ha)
Algeria	36 719	18.84	--	--	74 062	38	110 781	56.84
Bahrain	--	--	--	--	--	--	--	--
Egypt	3 260	72.47	--	--	--	--	3 260	72.47
Iran (Islamic Republic of)	888 535	82.64	--	--	--	--	888 535	82.64
Iraq	25 468	30.87	--	--	--	--	25 468	30.87
Jordan	3 337	34.23	--	--	--	--	3 337	34.23
Kuwait	--	--	--	--	--	--	--	--
Lebanon	5 048	35.22	--	--	--	--	5 048	35.22
Libya	6 050	27.88	1 319	6.08	--	--	7 369	33.96
Mauritania	10 929	34.94	--	--	--	--	10 929	34.94
Morocco	149 764	26.08	16 194	2.82	124 727	21.72	290 685	50.62
Oman	162	64.77	--	--	--	--	162	64.77
Palestine	--	--	--	--	--	--	--	--
Qatar	0	0	0	0	0	0	0	0
Saudi Arabia	16 189	16.57	--	--	33 423	34.21	49 612	50.78
Sudan	618 350	33.68	--	--	--	--	618 350	33.68
Syrian Arab Republic	15 950	30.55	--	--	--	--	15 950	30.55
Tunisia	25 931	36.9	--	--	--	--	25 931	36.9
United Arab Emirates	15 878	50.04	2 894	9.12	--	--	18 771	59.16
Yemen	5 166	9.41	1 867	3.4	19 220	35.01	26 253	47.82
Total	**1 826 735**	**44.00**	**22 274**	**3.26**	**251 432**	**27.28**	**2 100 441**	**50.60**

-- = missing data on carbon stocks.

Figure 11. Forest carbon by country, 2020



Country-specific data on carbon stocks in litter, dead wood and soil carbon are largely absent, and the common practice in such cases is to apply IPCC default values.

For the countries that have reported on soil carbon stock, the reported values for soil carbon make up a large fraction of the country's reported total carbon stock.

As shown in Figure 11, the reported values for soil carbon for Algeria (67 percent), Morocco (43 percent), Saudi Arabia (67 percent) and Yemen (73 percent) are significant, often exceeding those for living biomass.

Algeria uses the IPCC default value for soils with high activity clay minerals in tropical dry regions (38 tonnes of carbon/ha for depths of 0–30 cm) for all of its forest areas (IPCC, 2003). The Moroccan figures for soil organic carbon (21.72 tonnes of carbon/ha for 0–30 cm depths) is based on estimates. Saudi Arabia and Yemen use the IPCC default value for soils with low activity clay minerals (IPCC, 2003) in tropical dry regions (35 tonnes of carbon/ha for 0–30 cm depths) to calculate their soil organic carbon pools.

The high proportion of soil carbon in relation to total carbon stock may be explained by two factors:

- applying a single default value for soil carbon to all the forest area may overestimate the soil organic carbon pool as some areas may be sandier and hold less soil organic carbon;
- the low levels of living biomass in NENA forests (Table 30) may make the default values relatively significant.

The scarcity of datasets on carbon stocks in dead wood, litter and soil carbon indicates possible areas in need of consolidation in order to strengthen FRA data reporting from the NENA region, possibly including the establishment of a standard way of handling the missing data. The data that are most complete are those on AGB and BGB, and therefore the living biomass carbon stock is currently the best measure for comparing carbon stocks among NENA countries.

The carbon stock of living biomass is derived from the biomass stock multiplied by a conversion factor of 0.47, i.e., every 1 tonne of biomass contains 0.47 tonnes of carbon. The trend in AGB and BGB shown in Table 30 is therefore similar to the trend in biomass shown in Figure 10. The discussion of trends in forest biomass stock in Section 4.3 therefore also applies to trends in the living biomass carbon stock.

Trends in forest carbon stock 1990–2020

Taking into consideration the limitations in the datasets on dead wood, litter and soil carbon, the overall trend in total forest carbon stock in the NENA region has been analysed by looking at the development of living biomass stock between 1990 and 2020 in the 17 reporting countries.

The total carbon stock of living biomass is calculated by multiplying the total forest area by the carbon stock of living biomass per hectare for the years 1990 and 2020. The overall

trend in total carbon stock between 1990 and 2020 in the region shows a small increase in the total living biomass carbon stock of 50 million tonnes (0.3 percent) driven mainly by increases in total carbon stock in the Islamic Republic of Iran and Tunisia. The living biomass carbon stock in tonnes per hectare increased by 10 percent over the same period (from 40 to 44 tonnes/ha) as shown in Table 30. As discussed in chapter 2, the area of forest in the region declined by 6 percent over the same period.

Table 30. Forest living biomass carbon stock by country, 1990 and 2020

Country	1990		2020		Difference	
	(million tonnes)	(tonnes/ha)	(million tonnes)	(tonnes/ha)	(million tonnes)	(tonnes/ha)
Algeria	31 140	18.68	36 719	18.84	5 580	0.16
Bahrain	--	--	--	--	--	--
Egypt	3 175	72.47	3 260	72.47	85	0.00
Iran (Islamic Republic of)	712 198	78.47	888 535	82.64	176 336	4.17
Iraq	25 744	32.02	25 468	30.87	-276	-1.15
Jordan	3 337	34.23	3 337	34.23	0	0.00
Kuwait	--	--	--	--	--	--
Lebanon	4 892	35.02	5 048	35.22	156	0.20
Libya	6 050	27.88	6 050	27.88	-	0.00
Mauritania	12 158	25.54	10 929	34.94	-1 229	9.40
Morocco	119 470	21.78	149 764	26.08	30 295	4.30
Oman	188	62.66	162	64.77	-26	2.11
Palestine	--	--	--	--	--	--
Qatar	0	0	0	0	0	0.00
Saudi Arabia	16 189	16.57	16 189	16.57	0	0.00
Sudan	793 848	33.68	618 350	33.68	-175 498	0.00
Syrian Arab Republic	11 367	30.55	15 950	30.55	4 583	0.00
Tunisia	19 989	31.04	25 931	36.90	5 942	5.86
United Arab Emirates	12 240	49.96	15 878	50.04	3 637	0.08
Yemen	5 166	9.41	5 166	9.41	0	0.00
Total	**1 777 152**	**40.06**	**1 826 735**	**44.00**	**49 583**	**3.95**

-- = missing data on carbon stock.

At the regional level, the forest area is decreasing, but the remaining forests are denser. This is a result of the loss of forest area occurring mainly in the NENA Sahel countries (Mauritania and the Sudan), which have low average growing stock per hectare, and possibly also because of improvements in management of the forests that remain.

The trends for the region cover opposing national trends:

- The Sudan, Mauritania, Oman and Iraq report reduced total living biomass carbon stocks over the three decades.
- Algeria, Egypt, The Islamic Republic of Iran, Lebanon, Morocco, the Syrian Arab Republic, Tunisia and the United Arab Emirates, on the other hand, report increasing total living biomass carbon stocks over the same period.

- The large gain reported by the Islamic Republic of Iran (176 000 million tonnes of living biomass carbon over the three decades) is of the same magnitude as the loss reported from the Sudan during the same period (-175 000 million tonnes of carbon).

Developments in forest living biomass carbon stock (in tonnes of carbon per hectare) reflect the trends in biomass stock described in Section 4.3:

- Iraq is the only country to report reduced living biomass carbon stock, implying a decreasing density of forest stands (-3.6 percent over the three decades), possibly as an effect of prolonged conflict.
- Algeria, the Islamic Republic of Iran, Lebanon, Mauritania, Morocco, Oman, Tunisia and the United Arab Emirates, report increases in living biomass carbon stock between 1990 and 2020. Most noticeable are the increases reported from Mauritania (36.8 percent), Morocco (19.7 percent) and Tunisia (18.9 percent).

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CHAPTER 5

DESIGNATION AND MANAGEMENT

CHAPTER 5

Designation and management

5.1 Regional overview

Six broad management categories were identified for FRA 2020:

1. Production	Forests where the management objective is production of wood, fibre, bioenergy and/or NWFPs.
2. Protection of soil and water	Forest where the management objective is protection of soil and water.
3. Conservation of biodiversity	Forest where the management objective is conservation of biological diversity, including but not limited to areas designated for biodiversity conservation in protected areas.
4. Social services	Forest where the management objective is social services.
5. Multiple use	Forest where the management objective is a combination of several purposes with none being significantly more important than the others.
6. Other	Forest where the management objective is other than production, protection, conservation, social services or multiple use.

Twelve countries, accounting for 95.5 percent of the regional forest area, reported on primary management objectives: Algeria, Bahrain, the Islamic Republic of Iran, Kuwait, Mauritania, Morocco, Qatar, Saudi Arabia, the Sudan, the Syrian Arab Republic, Tunisia and the United Arab Emirates. Regional trends are summarized in Table 31 and Figure 12. Non-reporting countries are by default classified in the unknown category in the FRA 2020 datasets: Egypt, Iraq, Jordan, Lebanon, Libya, Oman, Palestine and Yemen.

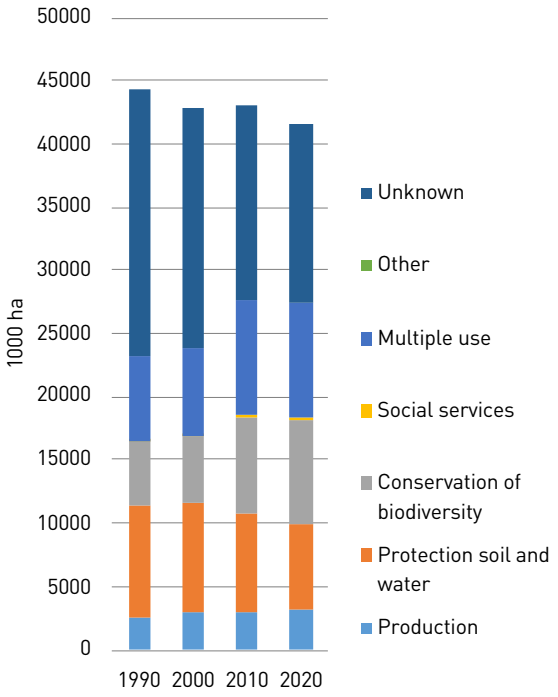
Table 31. Forest area by primary management objective in the NENA region, 1990–2020

Year	Production		Protection soil and water		Conservation of biodiversity		Social services		Multiple use		Other		Unknown		Total
	('000 ha)	% of total forest area	('000 ha)	% of total forest area	('000 ha)	% of total forest area	('000 ha)	% of total forest area	('000 ha)	% of total forest area	('000 ha)	% of total forest area	('000 ha)	% of total forest area	('000 ha)
1990	2 519.8	5.7	8 917.0	20.1	5 084.3	11.5	2.8	0.01	6 589.1	14.85	0	0.0	21 266.6	47.9	44 379.5
2000	3 005.6	7.0	8 694.1	20.2	5 098.0	11.9	2	0.00	7 062.1	16.45	0	0.0	19 079.8	44.4	42 941.6
2010	3 020.3	7.0	7 668.4	17.8	7 668.1	17.8	164.8	0.38	9 109.4	21.13	0	0.0	15 487.1	35.9	43 118.0
2020	3 078.7	7.4	6 822.6	16.4	8 229.2	19.8	165	0.40	9 114.0	21.94	0	0.0	14 121.7	34.0	41 531.2

For the six broad management categories, the following changes occurred between 1990 and 2020:

- Area of production forest increased by 22.2 percent.
- Area of forest for protection of water and soil decreased by 23.5 percent.
- Area of forest for conservation of biodiversity increased by 61.9 percent.
- Area of forest for social services increased from 2 800 ha in 1990 to 165 000 ha in 2020 – a 5 792 percent increase owing to large areas being reported in this category by Morocco from 2010.
- Area of forest for multiple use increased by 38.3 percent.
- No area of forest was reported in the "other" primary management objective category.
- Area of forest with unknown management objective decreased by 33.6 percent.

Figure 12. Forest area in the NENA region by primary management objective, 1990–2020



Over the three reporting decades, increasing forest areas in the NENA region are designated by primary management objective. However, in 2020 about a third of the total (mainly in the Sudan) was still categorized as being of unknown primary management objective.

5.2 Analysis by designation category

PRODUCTION

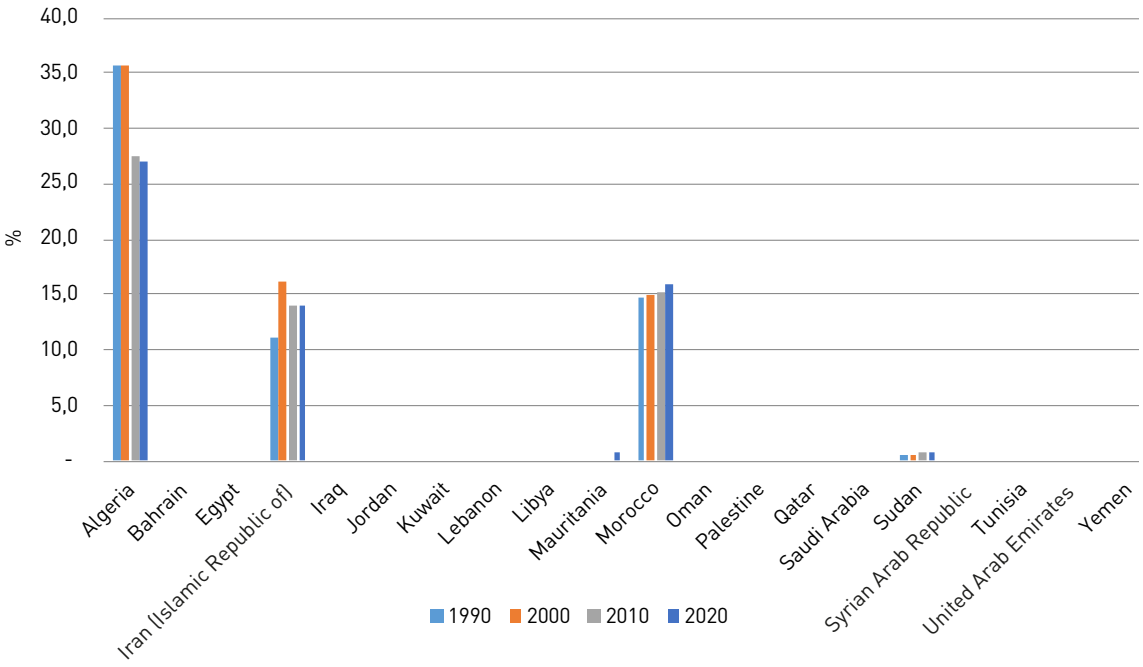
Status: Five countries (Algeria, the Islamic Republic of Iran, Mauritania, Morocco and the Sudan) reported forest areas with production designated as the primary management objective, as indicated in Table 32 and Figure 13. Together, the five countries account for 89.4 percent of the total forest area in the NENA region in 2020. Forests with production as the primary management objective account for 7.4 percent of the total forest area of the region.

Table 32. Forest area designated primarily for production by country, 1990–2020

Reporting country*	% of forest area (2020)	Area designated for production ('000 ha)				Annual change ('000 ha)		
		1990	2000	2010	2020	1990–2000	2000–2010	2010–2020
Algeria	27	596	562	527	526	-3.4	-3.5	-0.1
Iran (Islamic Republic of)	16	1 000	1 500	1 500	1 500	50	0	0
Mauritania	0.6	0	0	0	2	0	0	0.2
Morocco	16	804	819	866	921	1.5	4.8	5.4
Sudan	0.7	120	125	127	130	0.5	0.2	0.3
Total	**7.4**	**2 520**	**3 006**	**3 020**	**3 079**	**48.6**	**1.5**	**5.8**

* Countries that have not reported any forest area with production as the primary management objective are not included in the table.

Figure 13. Percentage of total forest area designated primarily for production by country, 1990–2020



Trends: In the region as a whole, a 22 percent increase in forest with production as the primary management objective was reported over the three decades 1990-2020:

- Algeria reported a reduced area designated for production over the period. However, in 2020 it still had 27 percent of its forest area designated for production as the primary management objective, which is the highest reported percentage for any country in the NENA region.
- The other four countries reported increasing areas and proportions of forest designated primarily for production.
- A very low percentage of the forest area of the NENA-Sahel countries has production as the primary management objective (Mauritania has 0.6 percent and the Sudan 0.7 percent), while Algeria, the Islamic Republic of Iran and Morocco have higher proportions of production forests (of between 16 and 27 percent).

PROTECTION OF SOIL AND WATER

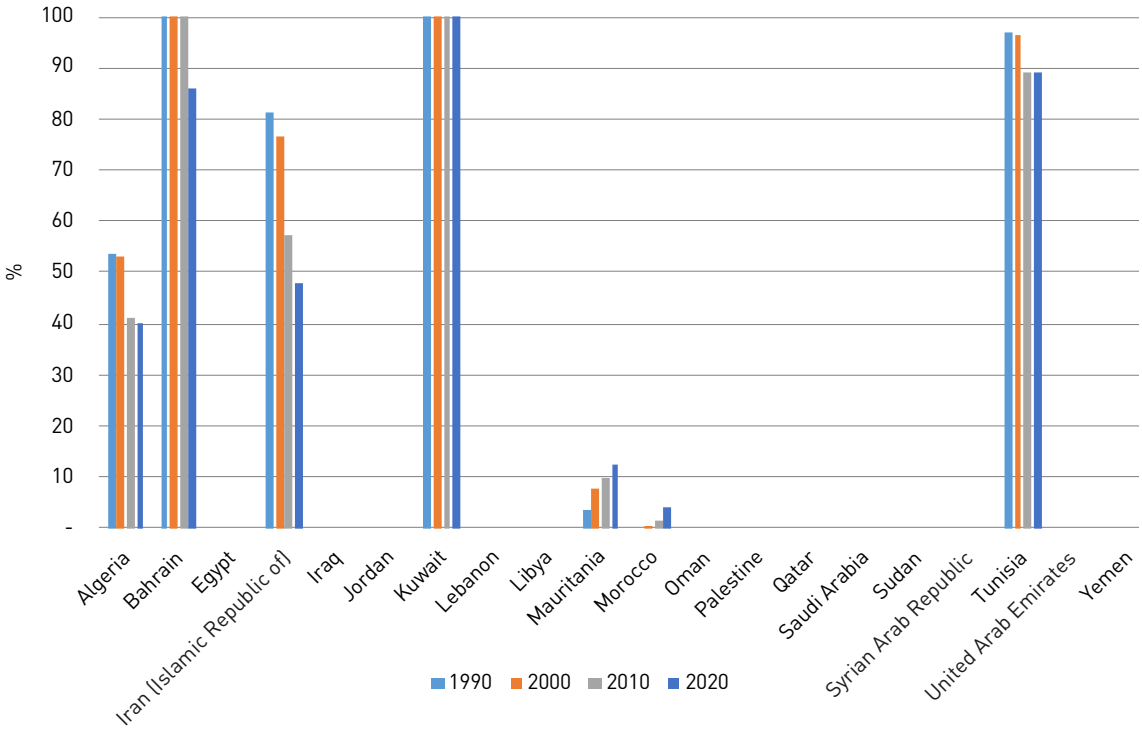
Status: Protection of soil and water is reported as the primary management objective for 16.4 percent of the total forest area of the NENA region in 2020. Seven of the 12 reporting countries (Algeria, Bahrain, the Islamic Republic of Iran, Kuwait, Mauritania, Morocco and Tunisia) reported forest areas where protection of soil and water is the designated primary management objective, as indicated in Table33 and Figure 14. The seven countries account for 46.9 percent of the NENA region's total forest area in 2020.

Table 33. Forest area designated primarily for protection of soil and water by country, 1990–2020

Reporting country*	% of forest area (2020)	Area designated for protection of soil and water ('000 ha)				Annual change ('000 ha)		
		1990	2000	2010	2020	1990–2000	2000–2010	2010–2020
Algeria	40.3	895	842	790	785	-5.3	-5.2	-0.5
Bahrain	85.7	0.2	0.4	0.5	0.6	0.02	0.02	0.01
Iran (Islamic Republic of)	47.7	7 377	7 136	6 135	5 127	-24.1	-100.1	-100.8
Kuwait	100	3.5	4.9	6.3	6.3	0.14	0.14	0.00
Mauritania	12.6	18	33	35	39	1.49	0.21	0.41
Morocco	4.1	0	33	88	237	3.3	5.5	14.9
Tunisia	89.3	623	645	613	627	2.2	-3.2	1.4
Total	**16.4**	**8 917**	**8 694**	**7 668**	**6 823**	**-22.3**	**-102.6**	**-84.6**

* Countries that have not reported any forest area with protection of soil and water as the primary management objective are not included in the table.

Figure 14. Percentage of total forest area designated primarily for soil and water protection by country, 1990–2020



Trends: In the region as a whole, there has been a decline of 23.5 percent in the area of forest with protection of soil and water as the primary management objective between 1990 and 2020:

- The decline is driven mainly by the reduction of forest designated for soil and water protection in the Islamic Republic of Iran.
- Kuwait reported 100 percent of its forest as designated for protection purposes to FRA 2020, while Bahrain reported 86 percent and Tunisia 89 percent.
- The proportion of forests that are managed primarily for protection of soil and water has declined in Algeria, the Islamic Republic of Iran and Tunisia, while it has increased in Morocco and Mauritania.

CONSERVATION OF BIODIVERSITY

Status: Conservation of biodiversity is reported as the primary management objective for 19.8 percent of the total forest area of the NENA region in 2020. Of the 12 reporting countries, six (Algeria, the Islamic Republic of Iran, Mauritania, Morocco, the Sudan and Tunisia) reported forest areas with conservation of biodiversity as the designated primary management objective, as indicated in Table 34 and Figure 15. Together the six countries account for 91.1 percent of the region's forest area in 2020. The figures reported from the Sudan account for 85 percent of the forest areas designated for biodiversity conservation.

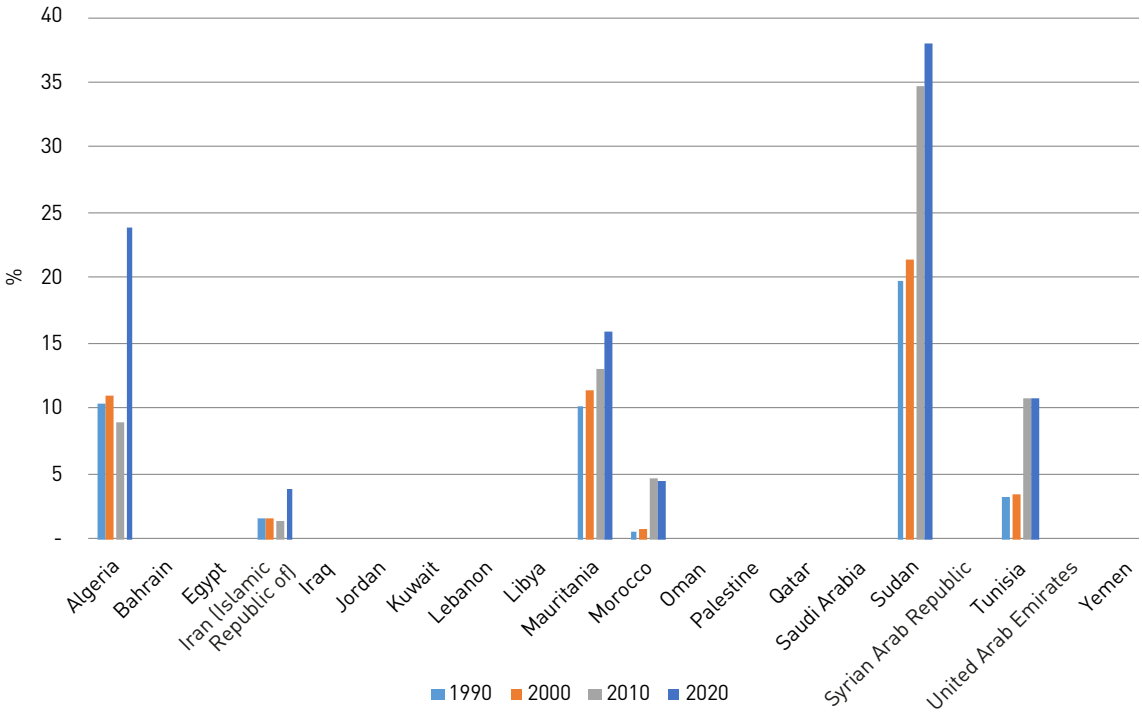
Table 34. Forest area designated primarily for conservation of biodiversity by country, 1990–2020

Reporting country*	% of forest area (2020)	Area designated for conservation of biodiversity ('000 ha)				Annual change ('000 ha)		
		1990	2000	2010	2020	1990–2000	2000–2010	2010–2020
Algeria	23.9	173	173	173	465	0	0	29.2
Iran (Islamic Republic of)	3.9	153	153	153	419	0	0	26.6
Mauritania	16.0	48	48	48	50	0	0	0.2
Morocco	4.5	35	47	261	261	1.2	21.4	0.0
Sudan	37.9	4 654	4 654	6 959	6 959	0.0	230.5	0.0
Tunisia	10.7	21	23	74	75	0.2	5.1	0.1
Total	**19.8**	**5 084**	**5 098**	**7 668**	**8 229**	**1.4**	**257.0**	**56.1**

* Countries that have not reported any forest area with conservation of biodiversity as the primary management objective are not included in the table.

Trends: In the region as a whole, a 61.9 percent increase of forest area with biodiversity conservation as the primary management objective was reported over the three decades 1990–2020. All reporting countries indicate increasing areas designated for biodiversity conservation during the reporting period, as shown in Figure 15.

Figure 15. Percentage of total forest area designated primarily for biodiversity conservation by country, 1990–2020



SOCIAL SERVICES

Status: Social services are reported as the primary management objective for 0.4 percent of the total forest area of the NENA region in 2020. Of the 12 reporting countries, two (Algeria and Morocco) reported forest areas with social services as the designated primary management objective, as indicated in Table 35 and Figure 16. Together, the two countries account for 18.5 percent of the region's forest area in 2020.

Table 35. Forest area designated primarily for social services by country, 1990–2020

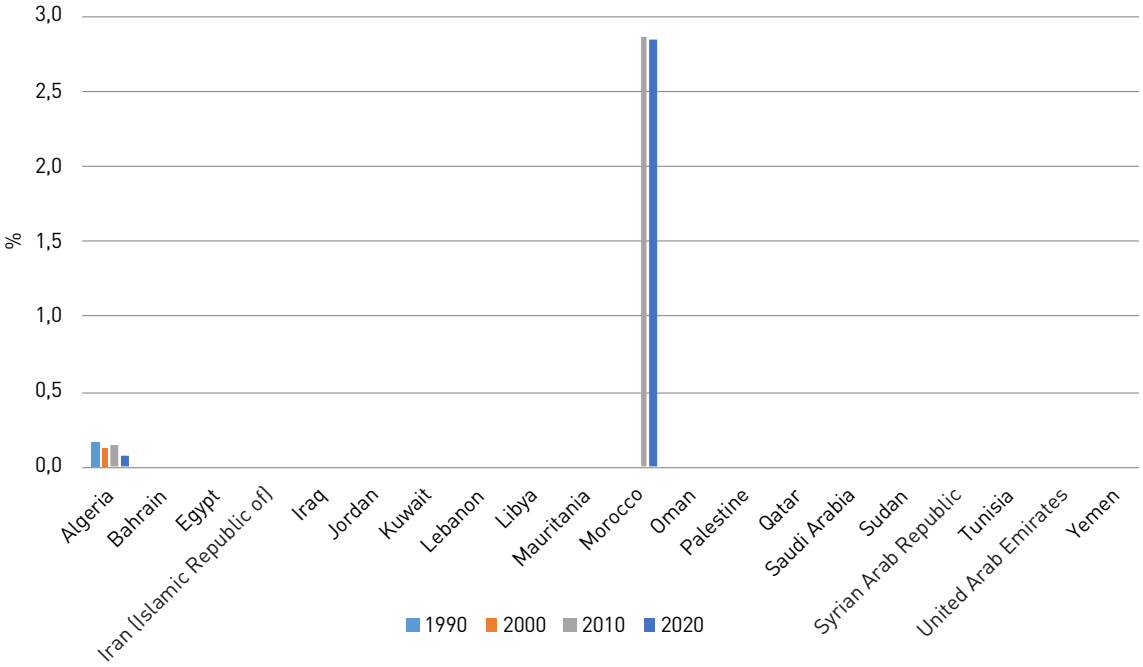
Reporting country*	% of forest area (2020)	Area designated for social services ('000 ha)				Annual change ('000 ha)		
		1990	2000	2010	2020	1990–2000	2000–2010	2010–2020
Algeria	0.08	2.8	2	2.8	1.6	-0.08	0.08	-0.12
Morocco	2.85	0	0	162	163.4	0	16.2	0.14
Total	**0.4**	**2.8**	**2**	**164.8**	**165**	**-0.08**	**16.28**	**0.02**

* Countries that have not reported any forest area with social services as the primary management objective are not included in the table.

Trends: The dataset is too small to show any regional trend as only two countries (Algeria and Morocco) reported forest areas in this category. In both cases, the area reported was of forests in urban or periurban settings that have a recreational use and that account for only a small fraction of the national forest area. Moroccan figures account for 99 percent of the total area under this management category, and the FRA 2020 country data states that area data were not available for 1990 and 2000.

Looking ahead, with increased urbanization and increased incorporation of green spaces into the urban fabric, it is likely that forests with recreation as the primary management objective will become more common.

Figure 16. Percentage of total forest area designated primarily for social services by country, 1990–2020



MULTIPLE USE

Status: Multiple use is reported as the primary management objective for 21.9 percent of the total forest area of the NENA region in 2020. Of the 12 reporting countries, six (the Islamic Republic of Iran, Mauritania, Morocco, Saudi Arabia, the Syrian Arab Republic and the United Arab Emirates) reported forest areas with multiple use as the designated primary management objective, as indicated in Table 36 and Figure 17. Together the six countries account for 87 percent of the forest area of the region.

Table 36. Forest area designated primarily for multiple use by country, 1990–2020

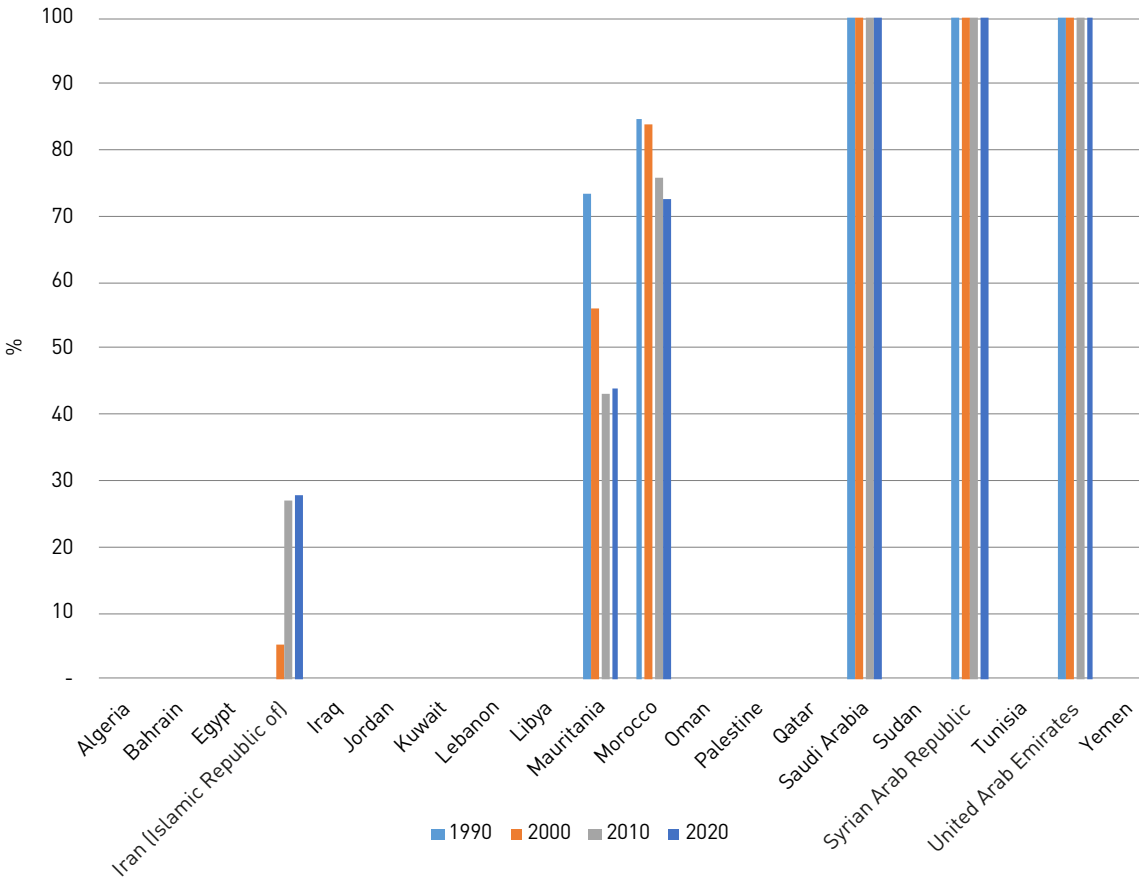
Reporting country*	% of forest area (2020)	Area designated for multiple use ('000 ha)				Annual change ('000 ha)		
		1990	2000	2010	2020	1990-2000	2000-2010	2010-2020
Iran (Islamic Republic of)	27.9	0	500	2 867	3 000	50.0	236.7	13.3
Mauritania	43.8	349	236	159	137	-11.3	-7.7	-2.2
Morocco	72.5	4 646	4 608	4 297	4 161	-3.9	-31.0	-13.7
Saudi Arabia	100.0	977	977	977	977	0.0	0.0	0.0
Syrian Arab Republic	100.0	372	432	492	522	6.0	6.0	3.0
United Arab Emirates	100.0	245	309	317	317	6.4	0.8	0.0
Total	**21.9**	**6 589**	**7 062**	**9 109**	**9 114**	**47.3**	**204.7**	**0.5**

* Countries that have not reported any forest area with multiple use as the primary management objective are not included in the table.

Trends: In the region as a whole, a 38 percent increase in forest area where multiple use is the primary management objective was reported over the three decades 1990–2020:

- Saudi Arabia, the Syrian Arab Republic and the United Arab Emirates report 100 percent of their forest areas as designated for multiple use throughout the three decades.
- Morocco and Mauritania report declining areas of forest designated for multiple use over the three decades.
- The regional increase in forests designated for multiple use is driven by changes in the Islamic Republic of Iran, which reports increasing areas designated for multiple use between 1990 and 2020.

Figure 17. Percentage of total forest area designated primarily for multiple use by country, 1990–2020



UNKNOWN PRIMARY MANAGEMENT OBJECTIVE

Status: According to the FRA 2020 country data, the primary management objective was unknown for 34 percent of the total forest area of the NENA region in 2020, as indicated in Table 37 and Figure 18.

Table 37. Forest area with unknown primary management objective by country, 1990–2020

Reporting country	% of forest area (2020)	Area with unknown management objective ('000 ha)				Annual change ('000 ha)		
		1990	2000	2010	2020	1990–2000	2000–2010	2010–2020
Algeria	8.8	0.2	0	425	171	-0.02	42.52	-25.38
Bahrain*	14.3	0	0	0	0.1	0	0.00	0.01
Egypt	100	44	59	66	45	1.5	0.64	-2.07
Iran (Islamic Republic of)	6.6	546	37	37	706	-50.9	0.00	66.89
Iraq	100	804	818	825	825	1.4	0.70	0.00
Jordan	100	98	98	98	98	0.0	0.00	0.00
Kuwait*	0.0	0	0	0	0	0.0	0.00	0.00
Lebanon	100	140	138	137	143	-0.2	-0.08	0.60
Libya	100	217	217	217	217	0.0	0.00	0.00
Mauritania	27.0	61	105	125	84	4.4	2.06	-4.09
Morocco	0.0	0	0	0	0	0.0	0.00	0.00
Oman	100	3	3	3	3	0.0	0.00	-0.05
Palestine	100	9	9	10	10	0.0	0.09	0.02
Qatar*	---	0	0	0	0	0.0	0.00	0.00
Saudi Arabia*	0.0	0	0	0	0	0.0	0.00	0.00
Sudan	61.4	18 796	17 047	12 995	11 271	-174.9	-405.20	-172.46
Syrian Arab Republic	0.0	0	0	0	0	0.0	0.00	0.00
Tunisia	0.0	0	0	0	0	0.0	0.00	0.00
United Arab Emirates*	0.0	0	0	0	0	0.0	0.00	0.00
Yemen	100	549	549	549	549	0.0	0.00	0.00
Total	**34.0**	**21 267**	**19 080**	**15 487**	**14 122**	**-218.687**	**-359.27**	**-136.54**

* Countries where the FRA 2020 information is based on desk studies.

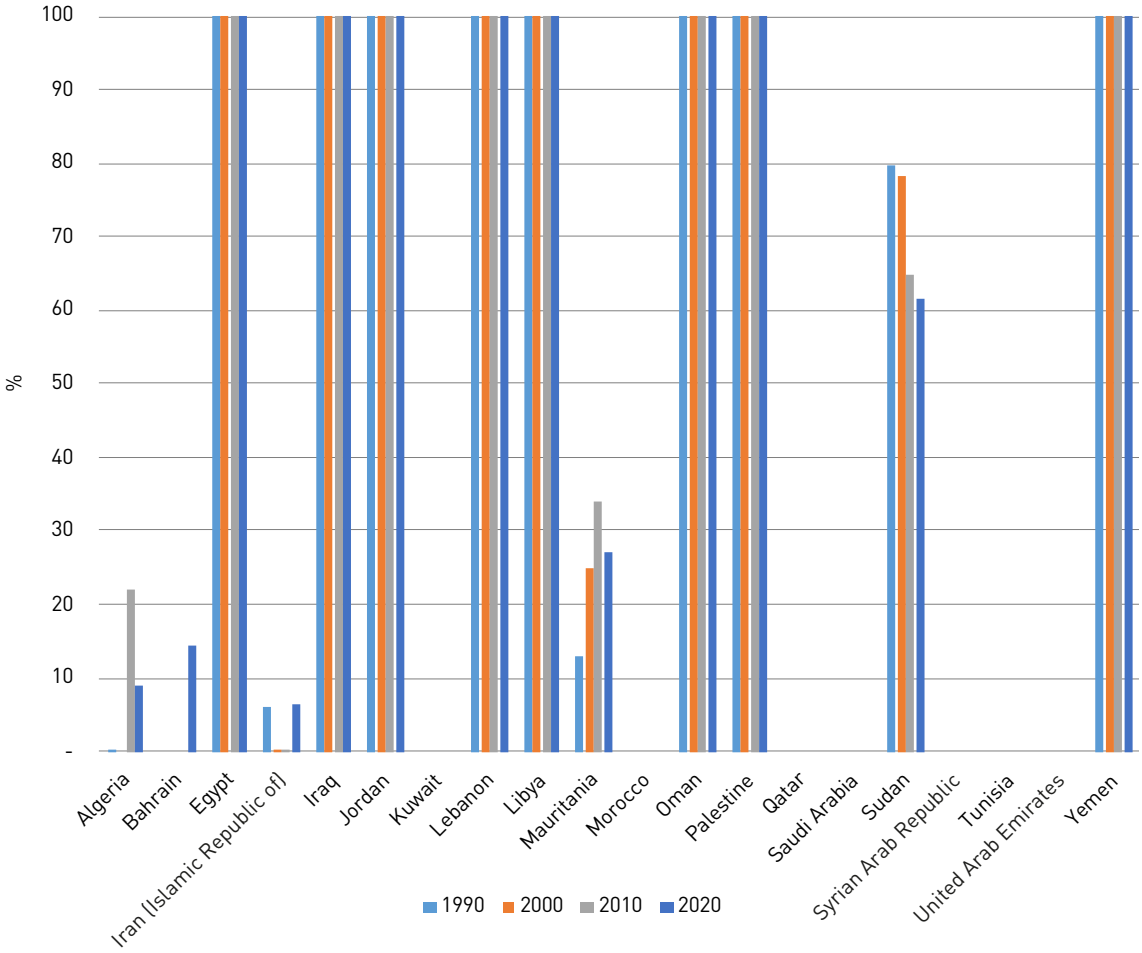
Trends: In the region as a whole, a 34 percent decrease in forest area with unknown primary management objective was reported over the three decades 1990–2020. Part of the explanation may be that more is known about forest resources in 2020 than in 1990, and forest management is more evolved. The loss of forest cover discussed in Chapter 2 (amounting to 6 percent of the region's forest between 1990 and 2020) is also likely to be part of the explanation, as the overall forest area is smaller in 2020 than it was in 1990. In addition, deforestation is more likely to occur in forests where management arrangements are unclear.

Over the three reporting decades, the proportion of the region's forest areas designated with primary management objectives has increased. In 1990, the primary management objective was unknown for 48 percent of the forest area, but by 2020 this proportion had fallen to 34 percent, equivalent to 14.1 million ha:

- By 2020 the primary management objective of about a third of the forest area of the NENA region was unknown, with 80 percent of these areas being in the Sudan and 6 percent in Iraq.
- The unknown category in FRA 2020 covers areas where the primary management objective is reported as unknown by the 12 reporting countries (accounting for 87 percent of the unknown area) and the forest areas of eight countries that did not report on the variable (accounting for 13 percent of the unknown area).

- Eight countries, together accounting for 4.5 percent of the region's forest area, classify the primary management objective as unknown for 100 percent of their forest areas owing to missing reporting on management objectives: Egypt, Iraq, Jordan, Lebanon, Libya, Oman, Palestine and Yemen.

Figure 18. Percentage of total forest area with unknown primary management objective by country, 1990–2020



5.3 Forest area in protected areas

Status: In FRA 2020, 11 countries (Algeria, Iraq, the Islamic Republic of Iran, Lebanon, Mauritania, Morocco, Qatar, Saudi Arabia, the Sudan, Tunisia and Yemen), accounting for 97 percent of the region's forest area in 2020, reported a total of 6.8 million ha of forest in protected areas. This corresponds to 16.8 percent of the total forest area of the reporting countries. The Sudan accounts for 69.7 percent of the total, and the Islamic Republic of Iran for 22.3 percent.

Forest area within legally established protected areas – FRA 2020 definition

Forest area within formally established protected areas independently of the purpose for which the protected areas were established. Protected areas includes IUCN [International Union for Conservation of Nature] Categories I–IV but excludes IUCN Categories V–VI. (FAO, 2018a)

Tables 38 and 39 and Figure 19 provide an overview by country and reporting year.

Table 38. Forest area in protected areas by country, 1990–2020

Reporting country*	% of forest area (2020)	Area in protected areas ('000 ha)				Annual change ('000 ha)		
		1990	2000	2010	2020	1990–2000	2000–2010	2010–2020
Algeria	6.11	119	119	119	119	0.0	0.0	0.0
Iran (Islamic Republic of)	14.04	--	--	1 069	1 510	--	--	44.1
Iraq	0	0	0	0	0	0.0	0.0	0.0
Lebanon**	0	--	--	--	--	--	--	--
Mauritania	15.98	48	48	48	50	0.0	0.0	0.2
Morocco	4.54	35	47	261	261	1.2	21.4	0.0
Saudi Arabia	0.31	--	--	3	3	--	--	0.0
Sudan	25.65	3 254	3 254	4 709	4 709	0.0	145.5	0.0
Qatar	0	0	0	0	0	0.0	0.0	0.0
Tunisia	10.72	21	23	74	75	0.2	5.1	0.1
Yemen	5.65	--	--	31	31	--	--	0.0
Total	**16.27**	**3 477**	**3 491**	**6 314**	**6 758**	**1.4**	**282.3**	**44.4**

* Countries that have not reported on the variable "forest areas in protected areas" are not included in the table.

** Lebanon reported 840 ha of forest in protected areas for 2017, but did not report any for other years.

-- = missing data.

Trends: Owing to an absence of data for 1990 and 2000, the trend is described only for the most recent decade (2010–2020). In the reporting countries, accounting for 97 percent of the region's forest area, a 7 percent increase in forest area in protected areas (439 900 ha) is reported between 2010 and 2020.

At the individual country level:

- no countries report a decline in the area of forest in protected areas over time;
- the area of forest in protected areas increases in the Sudan between 1990 and 2020, while there is also a reported loss of forest cover between 1990 and 2020 (Chapter 2) indicating that the forest loss is occurring primarily in forests outside protected areas.

The proportion of forest area within legally established forest areas is used as a subindicator for SDG reporting (SDG indicator 15.2.2). The year 2015 is used as the baseline for forest area, in order to avoid the effects of changes in forest area:

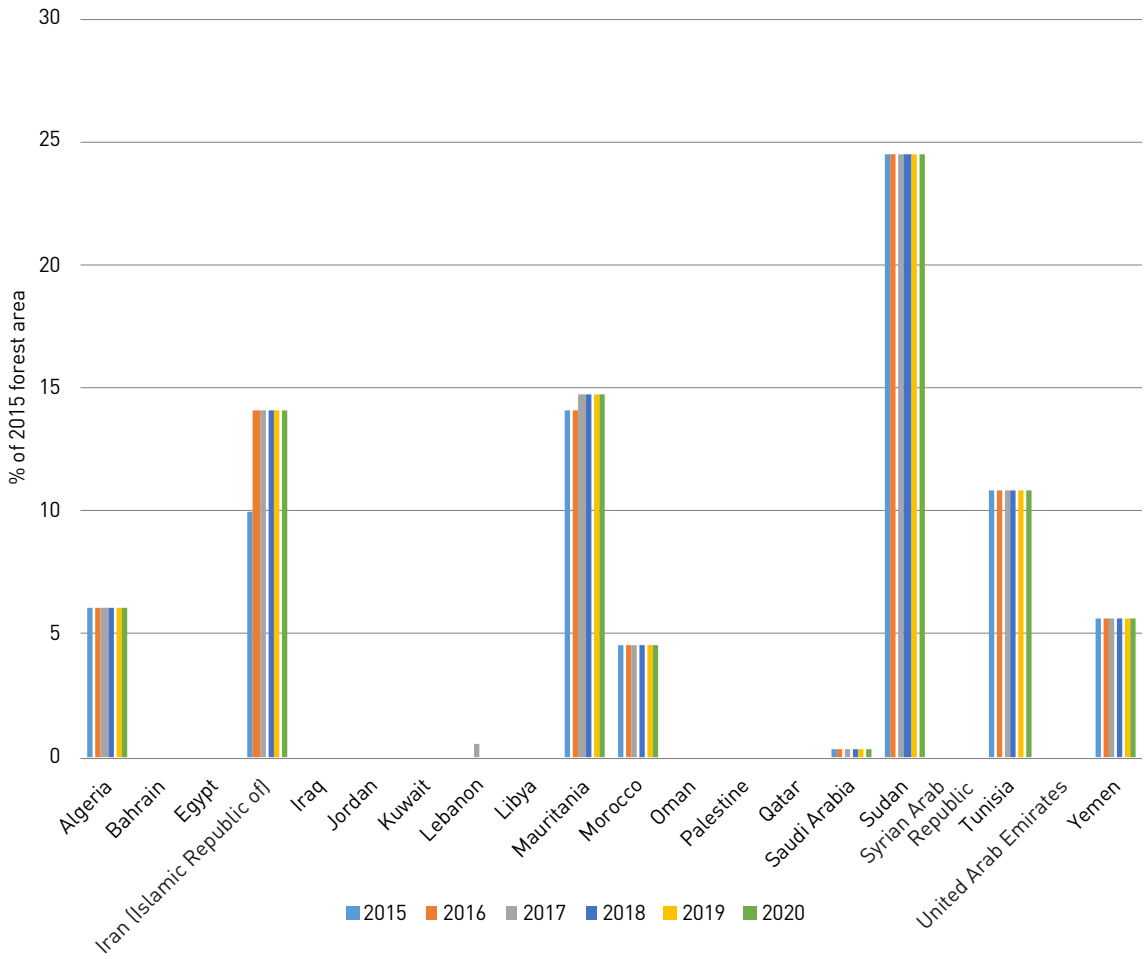
- The area of forest in legally protected areas is stable for Algeria, Morocco, Saudi Arabia, the Sudan, Tunisia and Yemen during the period 2015–2020.
- The Islamic Republic of Iran and Mauritania experience increases between 2015 and 2020 in the area of forest found in legally protected areas.
- Data for Lebanon indicate 840 ha of forest in protected areas for 2017 only, which may reflect a data error.

Table 39. Proportion of forest area in protected areas by country, 2015–2020 (2015 baseline)

Reporting country*	2015 (%)	2016 (%)	2017 (%)	2018 (%)	2019 (%)	2020 (%)
Algeria	6.08	6.08	6.08	6.08	6.08	6.08
Iran (Islamic Republic of)	10.00	14.12	14.12	14.12	14.12	14.12
Iraq	0.00	0.00	0.00	0.00	0.00	0.00
Lebanon	0.00	0.00	0.60	0.00	0.00	0.00
Mauritania	14.12	14.12	14.70	14.70	14.70	14.70
Morocco	4.59	4.59	4.59	4.59	4.59	4.58
Saudi Arabia	0.31	0.31	0.31	0.31	0.31	0.31
Sudan	24.51	24.51	24.51	24.51	24.51	24.51
Qatar	0.00	0.00	0.00	0.00	0.00	0.00
Tunisia	10.84	10.84	10.84	10.84	10.84	10.84
Yemen	5.65	5.65	5.65	5.65	5.65	5.65

* Countries that have not reported on the variable "forest areas in protected areas" are not included in the table.

Figure 19. Proportion of forest area in protected areas by country, 2015–2020 (2015 baseline)



5.4 Forest area with a long-term management plan

Status: In FRA 2020, eight countries (Algeria, Iraq, the Islamic Republic of Iran, Mauritania, Morocco, Qatar, the Sudan and Tunisia),accounting for 93.05 percent of the region's forest area 2020, reported a total of 12.3 million ha of forest with long-term management plans. This corresponds to 31.8 percent of the total forest area of the reporting countries. The Sudan accounts for 40.2 percent of the total reported area, Morocco for 28.5 percent and the Islamic Republic of Iran for 25.2 percent. Table 40 and Figure 20 provide an overview by country and reporting year.

Forest area with a long-term forest management plan – FRA 2020 definition

Forest area that has a long-term (ten years or more) documented management plan, aiming at defined management goals, and which is periodically revised. (FAO, 2018a)

Table 40. Forest area with a long-term management plan by country, 1990–2020

Reporting country*	% of forest area (2020)	Area with long-term management plan ('000 ha)				Annual change ('000 ha)		
		1990	2000	2010	2020	1990–2000	2000–2010	2010–2020
Algeria	13.55	--	--	152	264	--	--	11.2
Iran (Islamic Republic of)	28.83	542	982	3 080	3100	44.1	209.8	2.0
Iraq	0	0	0	0	0	0.0	0.0	0.0
Mauritania	0.16	0	0	6.4	0.5	0.0	0.64	-0.59
Morocco	60.95	622	1 389	2 445	3500	76.7	105.6	105.5
Qatar	0	0	0	0	0	0.0	0.0	0.0
Sudan	26.97	3 344	3 358	4 913	4951	1.5	155.5	3.8
Tunisia	69.19	486	486	486	486	0.0	0.0	0.0
Total	**29.62**	**4 994**	**6 216**	**11 083**	**12 302**	**122.3**	**486.7**	**121.8**

Countries that did not report on the variable "forest area with a long-term management plan" are not included in the table.
-- = missing data.

Trends: In the reporting countries (excluding Algeria owing to missing data for the period from 1990 and 2000), a 141 percent increase in forest with long-term management plans is reported between 1990 and 2020. The increase occurs mainly in the middle decade (2000–2010). The increase in the most recent decade (2010–2020) is 11 percent, including Algeria. At the individual country level:

- the only decline in forest area under long-term management plan is reported by Mauritania for the last decade (2010–2020);
- the Islamic Republic of Iran, Morocco and the Sudan reported increases in the proportion of forest with long-term management plans between 1990 and 2020, and Algeria between 2010 and 2020;
- Tunisia reported a stable area under a long-term forest management plan, and Iraq and Qatar reported zero values throughout the three decades.

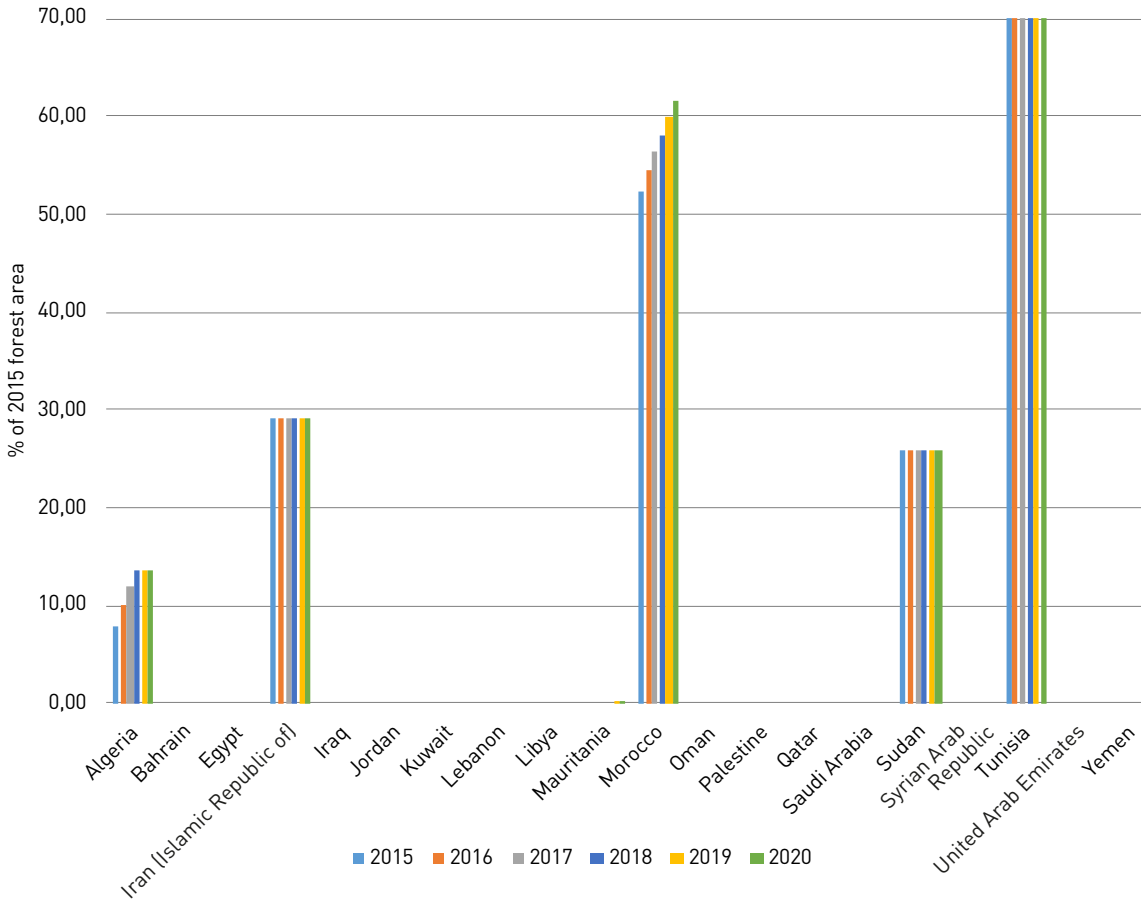
The proportion of forest area with long-term management plans is used as a subindicator for SDG reporting (SDG indicator 15.2.2). The year 2015 is used as the baseline year for forest area, in order to avoid the effects of changes in forest area. The results for the period 2015–2020 for reporting countries are indicated in Table 41 and Figure 20.

Table 41. Proportion of forest area with a long-term management plan by country, 2015–2020 (2015 baseline)

Reporting country*	2015 (%)	2016 (%)	2017 (%)	2018 (%)	2019 (%)	2020 (%)
Algeria	7.77	10.07	11.86	13.50	13.50	13.50
Iran (Islamic Republic of)	28.99	28.99	28.99	28.99	28.99	28.99
Iraq	0.00	0.00	0.00	0.00	0.00	0.00
Mauritania	0.00	0.00	0.00	0.00	0.12	0.15
Morocco	52.40	54.53	56.35	58.05	59.81	61.57
Qatar	0.00	0.00	0.00	0.00	0.00	0.00
Sudan	25.77	25.77	25.77	25.77	25.77	25.77
Tunisia	69.95	69.95	69.95	69.95	69.95	69.95

* Countries that have not reported on the variable "forest area with a long-term forest management plan" are not included in the table.

Figure 20. Proportion of forest area with a long-term forest management plan by country, 2015–2020 (2015 baseline)



The figures reported show that long-term management plans for forest areas are becoming more common in the NENA region, which is a positive development. However, the figures also show that 68.2 percent of the region's forests are not yet under long-term management plans. Only eight out of 20 countries reported on forests under long-term management plans and two of those reporting countries reported values of zero, indicating that there is room for enhancement of long-term planning for sustainable forestry management and practices.

FOREST AREA WITH A LONG-TERM MANAGEMENT PLAN IN PROTECTED AREAS

Status: This is a subcategory of forests with long-term management plans. For FRA 2020, six countries (Iraq, Mauritania, Morocco, Qatar, the Sudan and Tunisia), accounting for 62.5 percent of the region's forest area, reported a total of 4.96 million ha of forest with long-term management plans and in protected areas. This corresponds to 19.2 percent of the total forest area of the reporting countries, as shown in Table 42. The Sudan accounts for 94.7 percent of the total reported area in this subcategory, Morocco for 3.9 percent, Tunisia for 1.4 percent and Mauritania accounts for 0.01 percent.

Table 42. Forest area with a long-term management plan in protected areas by country, 1990–2020

Reporting country*	% of forest area (2020)	Area with a long-term management plan in protected areas ('000 ha)				Annual change ('000 ha)		
		1990	2000	2010	2020	1990–2000	2000–2010	2010–2020
Iraq	0	0	0	0	0	0.0	0.0	0.0
Mauritania	0.16	--	--	--	1	0.0	0.0	0.1
Morocco	3.38	11	16	194	194	0.5	17.8	0.0
Qatar	0	0	0	0	0	0.0	0.0	0.0
Sudan	25.65	3 254	3 254	4 709	4 709	0.0	145.5	0.0
Tunisia	9.85	0	0	56	69	0.0	5.6	1.3
Total	**11.97**	**3 265**	**3 270**	**4 959**	**4 973**	**0.5**	**168.8**	**1.4**

* Countries that have not reported any forest area with a long-term management plan in protected areas are not included in the table.

-- = no data submitted.

Trends: All reported figures have zero or positive values, indicating that increasing areas of forest in protected areas are under long-term management plans. Notable higher figures are reported for the middle decade (2000–2010) than for the decades before and after. The dataset is however too small to indicate any solid trends. In 2020, Mauritania reported that 100 percent of its forest area with long term management plans is in protected areas. For the Sudan the proportion is 95 percent, for Tunisia it is 14 percent and for Morocco it is 6 percent.

FOREST AREA UNDER AN INDEPENDENTLY VERIFIED FOREST MANAGEMENT CERTIFICATION SCHEME

In 2020, no forest areas in the NENA region were registered under an independently verified forest management certification scheme. Morocco is the only country ever to have reported on this category, with 20 270 ha reported for 2010 only, and no figure in its national report for FRA 2020.

Forest certification schemes are voluntary market-based tools that document forest management practices that are environmentally and socially sustainable and for which the costs incurred are recovered through sales of forest products.

The forestry sector in most NENA countries is very small, with limited exports of wood products. In addition, many countries do not have tradition in long-term forest management planning. It is therefore understandable that certification schemes are not yet common practice in the region.

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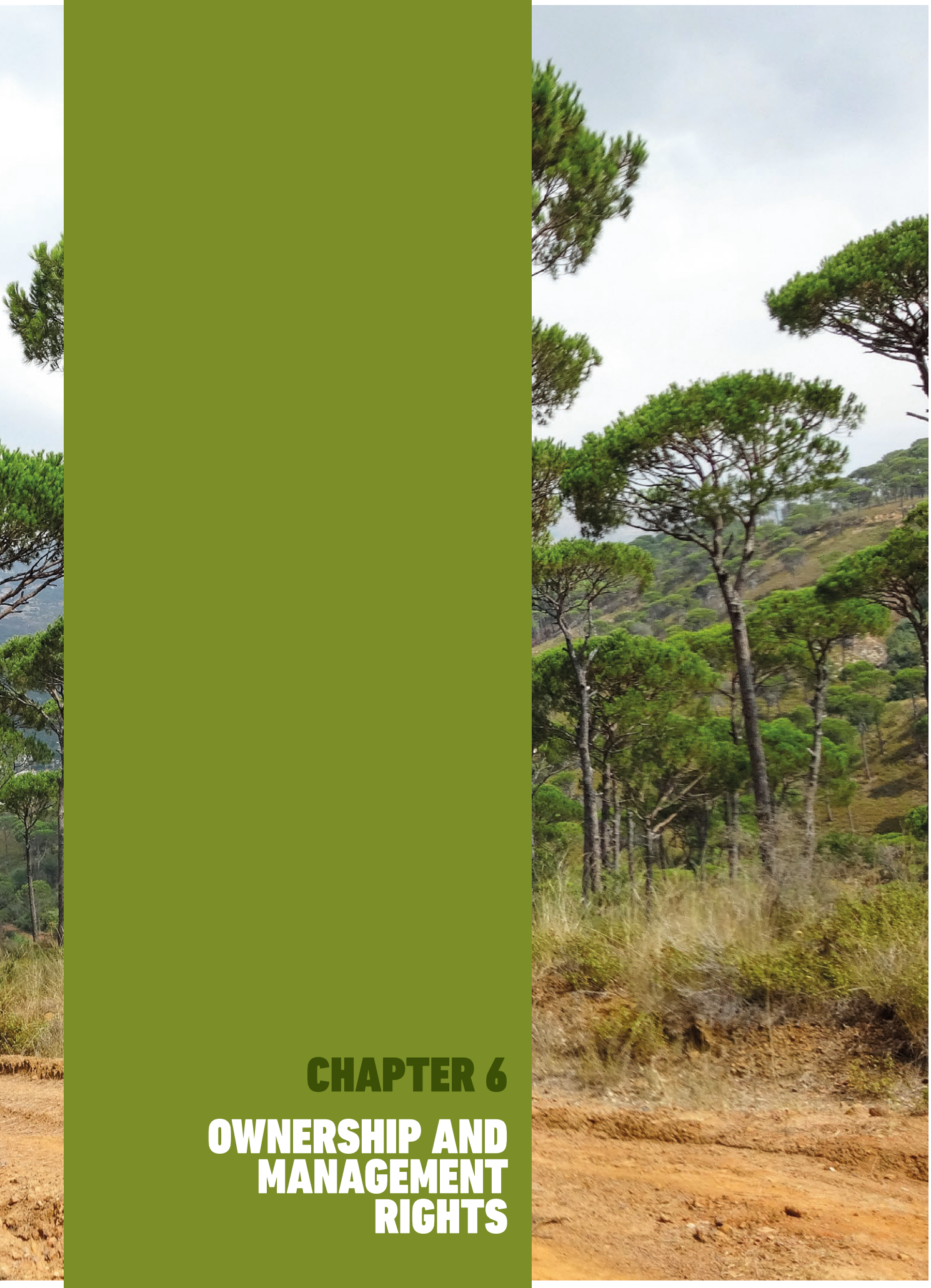


CHAPTER 6

OWNERSHIP AND MANAGEMENT RIGHTS

CHAPTER 6

Ownership and management rights

Ownership – FRA 2020 definitions
Private ownership: Forest owned by individuals, families, communities, private cooperatives, corporations and other business entities, religious and private educational institutions, pension or investment funds, NGOs, nature conservation associations and other private institutions.
Public ownership: Forest owned by the State; or administrative units of the Public Administration; or by institutions or corporations owned by the Public Administration.
Other types of ownership/unknown: Other kinds of ownership arrangements not covered by public or private ownership or forest area where ownership is unknown. (FAO, 2018a)

FRA 2020 collected information on ownership and management rights for 1990, 2000, 2010 and 2015. Three main forest ownership categories were assessed:

1. public ownership;
2. private ownership;
3. unknown/other.

Forest areas under private ownership are further subdivided into three subcategories:

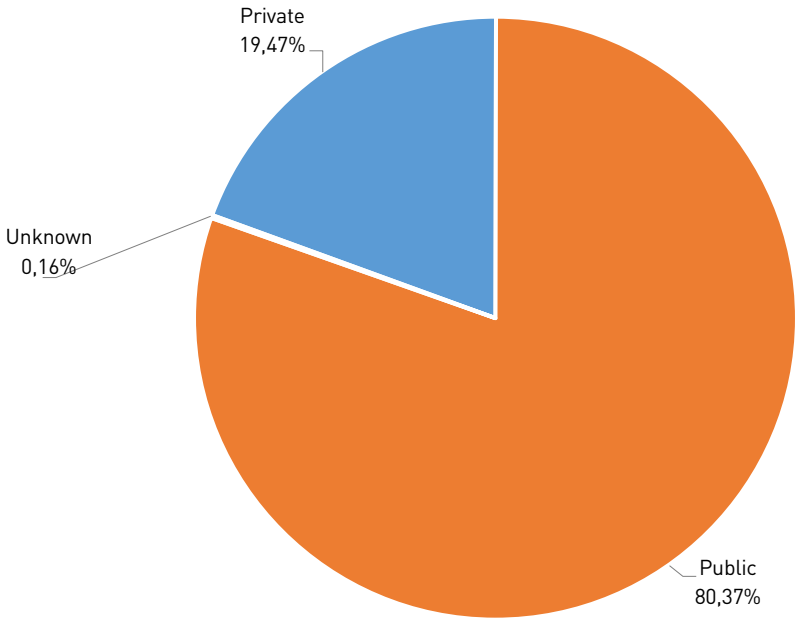
1. forest owned by individuals;
2. forest owned by business entities or institutions;
3. forest owned by local, tribal or indigenous communities.

For forest areas under public ownership, FRA 2020 also reports on management rights.

6.1 Forest ownership

Status: At the global level, 73 percent of the forest area was reported as under public ownership, 22 percent under private ownership and 4 percent under unknown ownership. The figures for the NENA region, shown in Figure 21, have a slightly higher proportion of public forests and a lower proportion of private and unknown ownership. These figures are based on the FRA 2020 reports from 14 countries accounting for 97.6 percent of the NENA forest area (2015).

Figure 21. Forest area in the NENA region by ownership category, 2015



Status:

- Five countries (Bahrain, Iraq, Islamic Republic of Iran, Kuwait and the United Arab Emirates) reported 100 percent of their 2015 forest areas as being publicly owned.
- Forest ownership is unreported for 100 percent of the forest areas of six countries (Egypt, Jordan, Lebanon, Libya, Palestine and the Syrian Arab Republic) accounting for 2.4 percent of the region's forest area in 2015.
- Qatar reported that forests are not found in the country.
- The remaining eight countries (Algeria, Mauritania, Morocco, Oman, Saudi Arabia, the Sudan, Tunisia and Yemen) reported a mixture of private and public forest ownership.

Table 43. Top five countries for forest under private ownership in the NENA region, 2015

Ranking	Country	Area ('000 ha)	% of total forest area
1	Sudan	521.60	95.0
2	Yemen	6 420.00	33.4
3	Oman	1.00	33.3
4	Mauritania	108.00	31.8
5	Algeria	361.00	18.5

Table 43 provides an overview of the top five countries in the NENA region with regards to the proportion of forests under private ownership.

An overview of forest ownership by reporting country is provided in Table 44.

Table 44. Forest ownership by country, 2015

Reporting country	% of forest area (2015)	Forest area ('000 ha)				% of forest area			
		Private	Public	Unknown	Unreported	Private	Public	Unknown	Unreported
Algeria	4.63	361.00	1 557.00	38.00		18.46	79.60	1.94	
Bahrain	0.001	-	0.60	-		-	100.00	-	
Egypt	0.11	-	-		48.42	-	-	-	100.00
Iran (Islamic Republic of)	25.28	-	10 691.98	-		-	100.00	-	
Iraq	1.95	-	825.00	-		-	100.00	-	
Jordan	0.23	-	-	-	97.50	-	-	-	100.00
Kuwait	0.01	-	6.25	-		-	100.00	-	
Lebanon	0.33	-	-	-	140.33	-	-	-	100.00
Libya	0.51	-	-	-	217.00	-	-	-	100.00
Mauritania	0.80	108.00	209.00	23.04		31.76	61.46	6.78	
Morocco	13.44	548.53	5 135.76	0.40		9.65	90.34	0.01	
Oman	0.01	1.00	2.00	-		33.33	66.67	-	
Palestine	0.02	-	-	-	10.14	-	-	-	100.00
Qatar	0.0	-	-	-		-	-	-	
Saudi Arabia	2.31	19.00	958.00	-		1.94	98.06	-	
Sudan	45.42	6 420.00	12 789.93	-		33.42	66.58	-	
Syrian Arab Republic	1.23	-	-	-	522.08	-	-	-	100.00
Tunisia	1.64	54.00	636.58	4.50		7.77	91.58	0.65	
United Arab Emirates	0.75	-	317.30	-		-	100.00	-	
Yemen	1.30	521.60	27.40	-		95.01	4.99	-	
Total	**100.0**	**8 033.13**	**33 156.80**	**65.94**	**1 035.47**	**18.99**	**78.40**	**0.16**	**2.4**

Trends: The trends in forest ownership are summarized in Table 45. At the regional level there is a slight increase (4 percent) in the area of privately owned forest between 1990 and 2015 and a decrease in the area of publicly owned forest (7 percent) over the same period driven by changes in the figures reported from Mauritania and the Sudan.

- The relative decreases in the area of publicly owned forests between 1990 to 2015 in the Sudan and Mauritania are 26.5 percent and 48.6 percent respectively. This may indicate indication that most of the forest cover loss in NENA Sahel countries is occurring in forest areas under public ownership.
- All other reporting countries report either constant or increasing areas of publicly owned forest, most notably Kuwait and Algeria with increases of 65 percent and 22.1 percent increase respectively.
- The area and proportion of forest with unknown ownership increase slightly between 1990 and 2015.

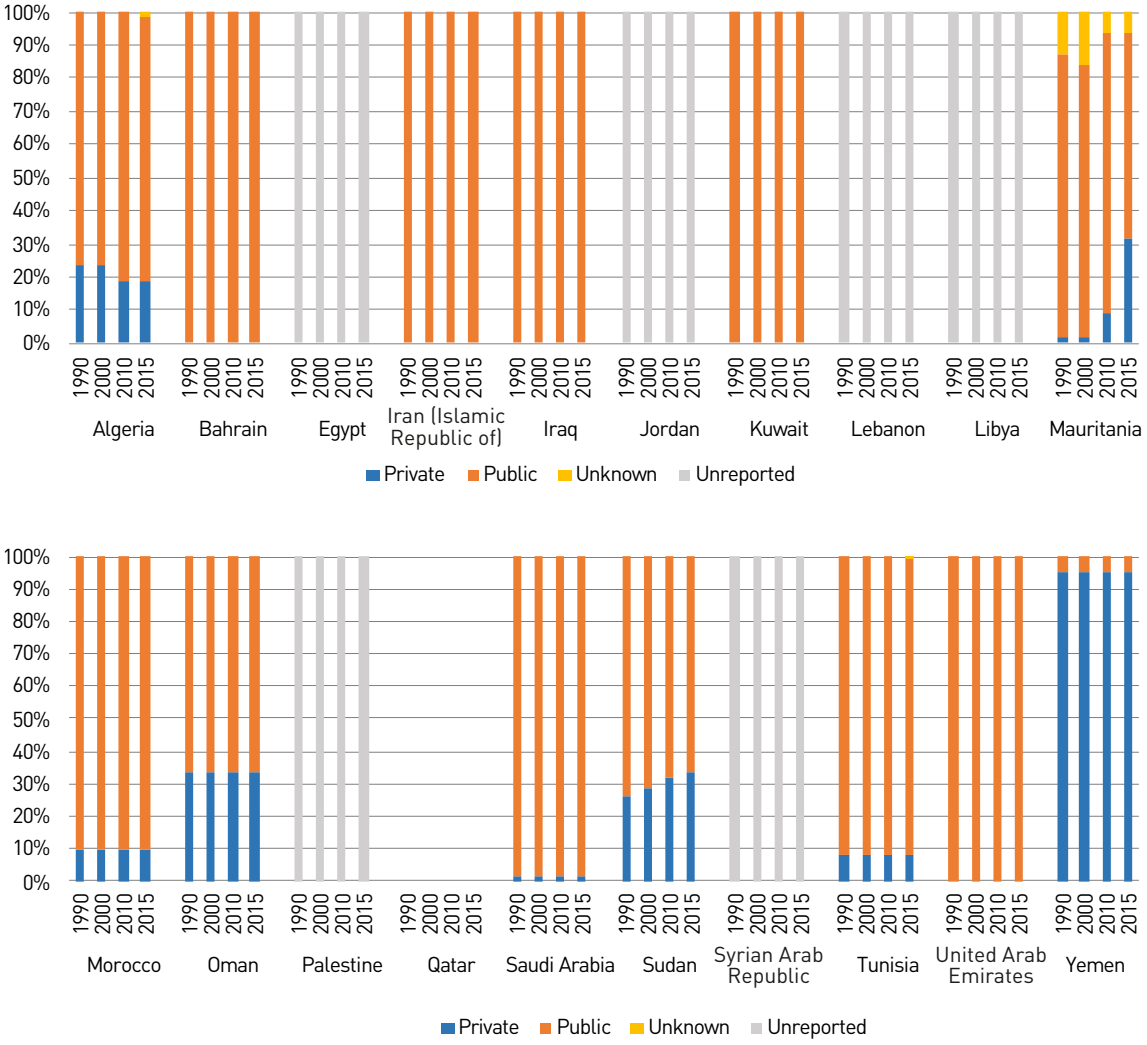
Table 45. Forest ownership by country, 1990–2015

Reporting country	% of forest area (2015)	Forest area ('000 ha)							
		Private		Public		Unknown		Unreported	
		1990	2015	1990	2015	1990	2015	1990	2015
Algeria	4.63	392.00	361.00	1 275.00	1 557.00	0.00	38.00		
Bahrain	0.001	0.00	0.00	0.22	0.60	0.00	0.00		
Egypt	0.11	--	--	--	--	--	--	43.81	48.42
Iran (Islamic Republic of)	25.28	0.00	0.00	9 076.06	10 691.98	0.00	0.00		
Iraq	1.95	0.00	0.00	804.00	825.00	0.00	0.00		
Jordan	0.23	--	--	--	--	--	--	97.50	97.50
Kuwait	0.01	0.00	0.00	3.45	6.25	0.00	0.00		
Lebanon	0.33	--	--	--	--	--	--	139.70	140.33
Libya	0.51	--	--	--	--	--	--	217.00	217.00
Mauritania	0.80	8.00	108.00	407.00	209.00	61.04	23.04		
Morocco	13.44	548.53	548.53	4 936.76	5 135.76	0.00	0.40		
Oman	0.01	1.00	1.00	2.00	2.00	0.00	0.00		
Palestine	0.02	--	--	--	--	--	--	9.08	10.14
Qatar	0.0	0.00	0.00	0.00	0.00	0.00	0.00		
Saudi Arabia	2.31	19.00	19.00	958.00	958.00	0.00	0.00		
Sudan	45.42	6 150.00	6420.00	17 420.31	12 789.93	0.00	0.00		
Syrian Arab Republic	1.23	--	--	--	--	--	--	372.08	522.08
Tunisia	1.64	54.00	54.00	589.98	636.58	0.00	4.50		
United Arab Emirates	0.75	0.00	0.00	245.00	317.30	0.00	0.00		
Yemen	1.30	521.60	521.60	27.40	27.40	0.00	0.00		
Total	**100.0**	**7 694.13**	**8 033.13**	**35 745.18**	**33 156.80**	**61.04**	**65.94**	**879.17**	**1 035.47**

-- = no figures reported.

Trends in the proportions of ownership types over time are illustrated in Figure 22.

Figure 22. Proportion of total forest area by ownership type and country, 1990–2015



6.2 Private ownership by type of owner

Status: Of the eight countries that reported areas under private ownership, only three provided a breakdown by subcategory –Mauritania, Tunisia and Yemen – together accounting for 3.7 percent of the NENA region's total forest area in 2015.
Table 46 presents the breakdown of private forest into subcategories for the three countries:

- Areas in the subcategories "individuals" and "business entities and institutions" have remained constant over the period 1990–2015 in all three countries.
- The area of forest in the subcategory "local, tribal and indigenous communities" is reported only by Mauritania and only since 2010, when 26 000 ha were reported in this subcategory. By 2015 this area had expanded to 100 000 ha.

Ownership – FRA 2020 definitions

Individual ownership: Forest owned by individuals and families.

Private business entities and institutions: Forest owned by private corporations, cooperatives, companies and other business entities, as well as private organizations such as NGOs, nature conservation associations, and private religious and educational institutions, etc.

Local, tribal and indigenous communities: Forest owned by a group of individuals belonging to the same community residing within or in the vicinity of a forest area, or forest owned by communities of indigenous or tribal people. The community members are co-owners that share exclusive rights and duties and benefits contribute to the community development. (FAO, 2018a)

Trends: FRA 2020 data on the subcategories of forest under private management in NENA are very limited so it is not possible to describe a trend based on them.

Table 46. Forest area under private ownership by ownership subcategory and country, 2015

Reporting country*	% total forest area 2015	Individuals		Business entities and institutions		Local, tribal and indigenous communities	
		('000 ha)	(%)	('000 ha)	(%)	('000 ha)	(%)
Mauritania	0.80	8.0	7.4	-	-	100.0	92.6
Tunisia	1.64	54.0	100.0	-	-	-	-
Yemen	1.3	439.2	84.2	82.4	15.8	-	-
Total	**3.7**	**501.2**	**73.3**	**82.4**	**12.05**	**100.0**	**14.63**

* Countries that have not reported any forest areas under the subcategories of private ownership are not included in the table.

6.3 Holders of management rights in publicly owned forests

Status: This section is based on data from 14 reporting countries accounting for 97.6 percent of the total forest area of the NENA region. Six countries (Egypt, Jordan, Lebanon, Libya, Palestine and the Syrian Arab Republic), accounting for 2.4 percent of the region's total forest area, did not report on the parameter. Table 47 summarizes the figures reported to FRA 2020.

In the reporting countries, 80.4 percent of the forest area is publicly owned, and almost all of this share (99.6 percent) is reported as being managed by public administrations with only 0.3 percent reported as being managed by private business entities and institutions (in Morocco and the Sudan). For the remaining 0.1 percent the management arrangements are unknown (Bahrain).

Holders of management rights in publicly owned forests – FRA 2020 definitions

Public administration: The Public Administration (or institutions or corporations owned by the Public Administration) retains management rights and responsibilities within the limits specified by the legislation.

Individuals: Forest management rights and responsibilities are transferred from the Public Administration to individuals or households through long-term leases or management agreements.

Private business entities and institutions: Forest management rights and responsibilities are transferred from the Public Administration to corporations, other business entities, private cooperatives, private non-profit institutions and associations, etc., through long-term leases or management agreements.

Local, tribal and indigenous communities: Forest management rights and responsibilities are transferred from the Public Administration to local communities (including indigenous and tribal communities) through long-term leases or management agreements.

Other forms of management rights: Forests for which the transfer of management rights does not belong to any of the categories mentioned above. (FAO, 2018a)

No countries reported any devolution of management rights to individuals or to local, tribal and indigenous communities.

Trends: At the global level the trend is for decreases in the proportion of publicly owned forest that is managed by public administrations, from 96 percent in 1990 to 83 percent in 2015. No such trend is apparent in the NENA region based on the national FRA reports. The proportion of publicly owned forests that are managed by public administrations has remained constant at 99.6 percent throughout the period 1990–2015.

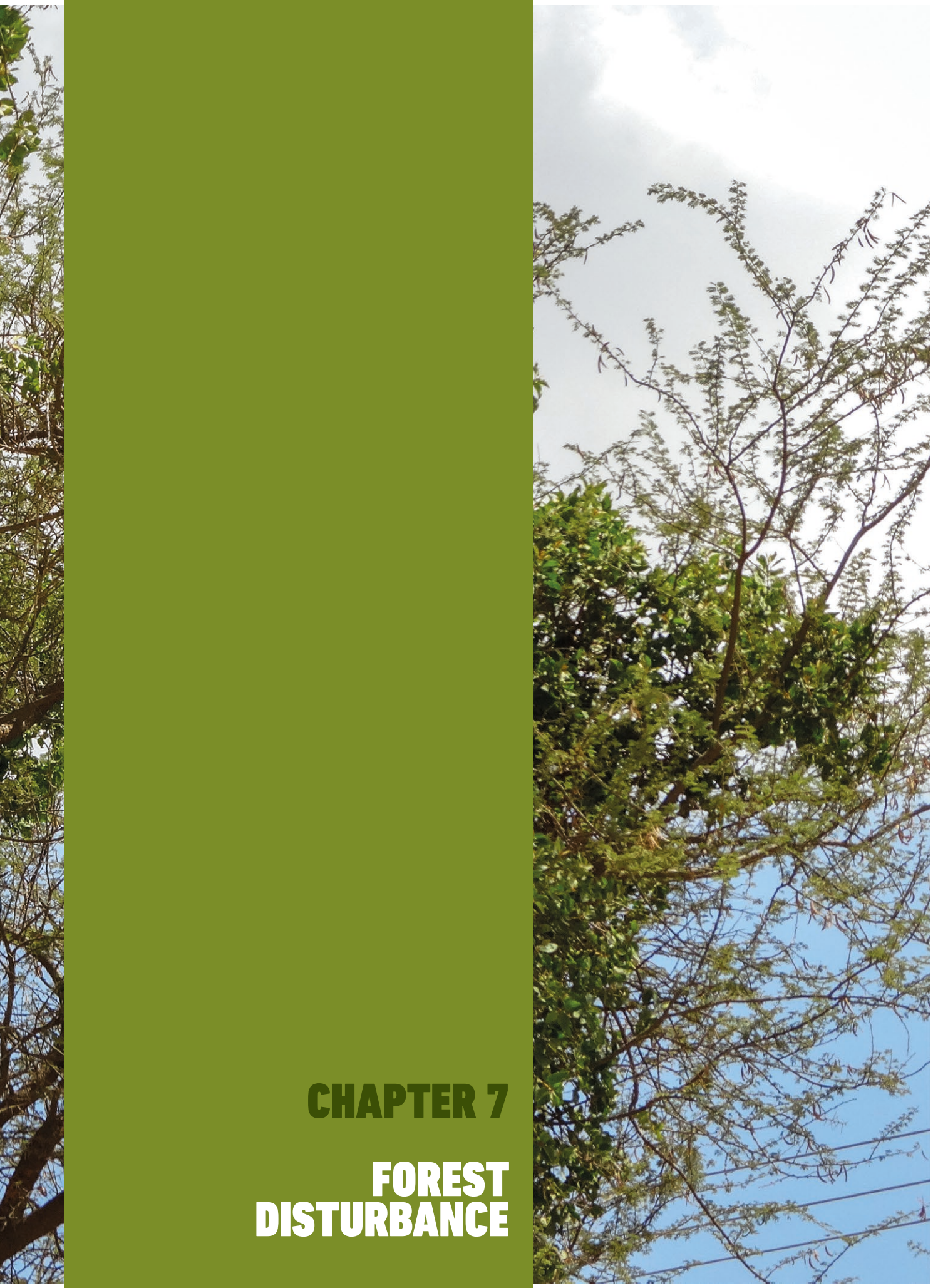
The 0.3 percent of publicly owned forest area that is managed by private business entities and institutions is made up of 40 000 ha in Morocco and 70 980 ha in the Sudan. These areas have remained constant throughout the period 1990–2015.

The data available on management rights in publicly owned forests are not sufficiently complete to illustrate regional trends.

Table 47. Management rights in publicly owned forest areas by country, 2015

Reporting country*	% total forest area 2015	Publicly owned forest under management rights ('000ha)									
		Public administration		Individuals		Private business entities and institutions		Local, tribal and indigenous communities		Unknown /other	
		('000 ha)	(%)	('000 ha)	(%)	('000 ha)	(%)	('000 ha)	(%)	('000 ha)	(%)
Algeria	4.63	1 557	100.0	0	0.0	0.00	0	0	0.0	0	0
Bahrain	0.001	0	0.0	0	0.0	0.00	0	0	0.0	0.6	100
Iran (Islamic Republic of)	25.28	10 691.98	100.0	0	0.0	0.00	0	0	0.0	0	0
Iraq	1.95	825	100.0	0	0.0	0.00	0	0	0.0	0	0
Kuwait	0.01	6.25	100.0	0	0.0	0.00	0	0	0.0	0	0
Mauritania	0.80	209	100.0	0	0.0	0.00	0	0	0.0	0	0
Morocco	13.44	5 095.76	99.2	0	0.0	40.00	1	0	0.0	0	0
Oman	0.01	2.4	120.0	0	0.0	0.00	0	0	0.0	0.4	20
Qatar	0.0	0	-	0	-	0.00	-	0	-	0	-
Saudi Arabia	2.31	958	100.0	0	0.0	0.00	0	0	0.0	0	0
Sudan	45.42	12 718.95	99.4	0	0.0	70.98	1	0	0.0	0	0
Tunisia	1.64	636.58	100.0	0	0.0	0.00	0	0	0.0	0	0
United Arab Emirates	0.75	317.3	100.0	0	0.0	0.00	0	0	0.0	0	0
Yemen	1.30	0	0.0	0	0.0	0.00	0	0	0.0	27.4	100
Total	**97.55**	**33 018.2**	**99.6**	**-**	**0**	**111.0**	**0.3**	**-**	**0**	**27.6**	**0.1**

* Countries that have not reported on the parameter "management rights in publicly owned forests" are not included in the table.



CHAPTER 7

FOREST DISTURBANCE

CHAPTER 7

Forest disturbance

The data for disturbance are reported as the areas affected annually. For the period 2000–2017 FRA 2020 reports on disturbance from insects, diseases, severe weather events and fire. For reporting on disturbance, data for 2015 are used as the baseline.

Disturbance – FRA 2020 definitions
Any biotic or abiotic factor adversely affecting the vigour and productivity of the forest that is not a direct result of human activities. (FAO, 2018a)

7.1 Insects

Six countries (Algeria, the Islamic Republic of Iran, Morocco, Qatar, the Sudan and Tunisia), accounting for 90.4 percent of the 2015 NENA forest area, reported insects as a cause of forest disturbance, as shown in Table 48. Two additional countries (Mauritania and Yemen) reported that insects were a problem, but that there were no numerical data on the extent of the disturbance. Fourteen countries did not report on the variable.

Status: Of the six reporting countries, four – Morocco, Qatar, the Sudan and Tunisia – reported figures for insect disturbance for the 2015 reference year. Of these, only Morocco, Qatar and Tunisia have complete time series for areas disturbed by insects over the full period (2000–2017). Algeria and the Islamic Republic of Iran reported only one year each: (2017 with 520.300 ha affected in Islamic Republic of Iran, and 2007 with 224 750 ha affected in Algeria. The Sudan reported for the years 1990, 2000, 2010 and 2015–2017.[1] For both the Sudan and Tunisia, figures for the most recent years (2015–2017) seem to be rounded estimates. Qatar reported 0 ha damaged by disease for all the years in the period, as there is no forest reported in Qatar. Mauritania did not report on areas affected by insects but stated that termites affect certain forest areas, although the size of the areas affected is unknown. Table 48 summarizes country submissions on the extent of disturbance by insects.

[1] The Sudan reported the following insects as damaging to forest areas:
Groundnut bruchid (*Caryedon serratus*) attacks the seeds of a wide range of plants including *Acacia* spp., *Cassia* spp., *Tamarindus* spp. and Bauhinia spp.
The buffalo treehopper (*Stictocephala bubalus*) may destroy seed crops.
Spiders (*Cyclops* sp.) can smother young growing tips. The larval stages of beetles, moths, butterflies, bees and wasps can damage the seeds.
Tree locusts (*Anacridium melanorhodon*) feed on a wide range of species including *Acacia senegal*, *Balanites aeagyptica*, fruit trees and agricultural crops. A major attack on A. senegal occurred in 1994.
The Acacia bagworm (*Auchmophila kordofensis* Rebel) is widely distributed in the Sudan savannah. The caterpillars feed mainly on *Acacia nubica* and *A. tortilis*, both important sources of fodder, fuelwood and timber in semi-arid areas.
The silver tree borer (*Sphenoptera chalcichroa*) feeds on Acacia Nilotica; major damage was reported in 2009.

Table 48. Forest area affected by insects by country
(2015 baseline)

Reporting country*	% of total forest area 2015	Forest area affected by insects 2015		Forest area affected annually 2000–2017 ('000 ha)			Number of data values 2000–2017
		('000 ha)	% of forest area	Maximum	Minimum	Average	
Algeria	4.63	--	--	224.75	224.75	224.75	1 (2007)
Iran (Islamic Republic of)	25.28	--	--	502.30	502.30	502.30	1 (2017)
Morocco	13.44	10.83	0.2	34.33	8.27	21.60	18 (2000–2017)
Qatar	0.00-	0.00	NA	0.00	0.00	0.00	18 (2000–2017)
Sudan	45.42	400.00	2.1	3 000.00	4.20	834.03	6 (2000, 2005, 2010, 2015–2017)
Tunisia	1.64	20.00	2.9	20.03	0.00	8.89	18 (2000–2017)
Total	**90.4**	**430.83**					

* Countries that have not reported any forest area disturbed by insects are not included in the table.

-- = missing reporting. NA = not applicable.

Trends: With the exceptions of Morocco, Qatar and Tunisia, averages for the period 2000–2017 are based on incomplete times series and therefore do not capture variation from year to year. The rounded figures reported in some cases are expert estimates. The incomplete nature of the dataset does not allow projections to be made.

7.2 Diseases

Four countries (the Islamic Republic of Iran, Mauritania, Qatar and the Sudan), accounting for 71.5 percent of the region's forest area in 2015, reported on diseases (bacteria, fungi phytoplasma and viruses) as a cause of forest disturbance, as shown in Table 49.
Status: Only the Sudan reported on disease disturbance for the 2015 reference year. As was the case with disturbance from insects, the Sudan reported on 1990, 2000, 2010 and 2015–2017[2] while the Islamic Republic of Iran reported on 2017 only.[3]

Table 49. Forest area affected by disease by country
(2015 baseline)

Reporting country*	% of total forest area 2015	Forest area affected by diseases 2015		Forest area affected annually 2000–2017 ('000 ha)			Number of data values 2000–2017
		('000 ha)	% of forest area	Maximum	Minimum	Average	
Iran (Islamic Republic of)	25.28	--	--	1 533.09	1 533.09	1533.09	1 (2017)
Qatar	0.00	0.00	na	0.00	0.00	0.00	18 (2000–2017)

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[2] Diseases reported by the Sudan are common leaf spot (*Xanthomonas axonopodis* or *X. campestris*) causing damage to the leaves of African mahogany (*Khaya senegalensis*) in drier regions of the country. The fungi *Cladosporium herbarium*, *Fusarium* sp., *Ravenelia acaciae-senegalae* and *R. acaciocola* attack *Acacia senegal*.

[3] The 2017 figures from the Islamic Republic of Iran relate to outbreaks of oak charcoal disease (*Biscogniauxia mediterranea*) affecting 1 496 000 ha in the Zagros forests, and boxwood blight (*Cylindrocladium buxicola*) affecting 37 094 ha in the Caspian forests.

Sudan	45.42	300.00	1.6	'000.00	200.00	433.33	6 (2000, 2005, 2010, 2015–2017
Mauritania	0.80	0.00	0.0	0.00	0.00	0.00	18 (2000–2017)
Total	**71.5**	**300.00**					

* Countries that have not reported any forest area disturbed by disease are not included in the table.

-- = missing reporting. NA = not applicable.

Trends: The same general observations as apply to the dataset on disturbance from insects in section 7.2 also apply to disturbance from disease. The FRA 2020 country submissions do not provide a complete overview of the extent of disturbance from disease in forests in the NENA region because 16 countries in the region did not report on this variable and the four that did submitted different degrees of detail and numbers of reporting years. The dataset does not therefore capture the variations from year to year or in diseases. The incomplete nature of the dataset also does not projections to be made.

7.3 Severe weather events

There are strong indications that extreme weather events are becoming more common as a consequence of the changing climate. Simulations of climate change for the NENA region show increasing temperatures and decreasing precipitation as possible future scenarios (IPCC, 2007). FRA 2020 collected country-specific information on the extent of damage to forest areas resulting from severe weather events. At the global level, 48 countries – accounting for 37 percent of the world's forest area – reported on this variable.

Status: For the NENA region, four countries (Mauritania, Qatar, the Sudan and Tunisia), accounting for 47.9 percent of the region's forest area in 2015, reported on forest disturbance from severe weather events (Table 50). As was the case for the other disturbance variables, the Sudan reported on 1990, 2000, 2010 and 2015–2017. Mauritania, Qatar and Tunisia reported no damage to weather events during the 17 reporting years.

Table 50. Forest area affected by severe weather events by country (2015 baseline)

Reporting country*	% of total forest area 2015	Forest area affected by insects 2015		Forest area affected annually 2000–2017 ('000 ha)			Number of data values 2000–2017
		('000 ha)	% of forest area	Maximum	Minimum	Average	
Sudan	45.42	400.00	2.1	600.00	400.00	450.00	6 (2000, 2005, 2010, 2015–2017
Mauritania	0.80	0.00	0	0.00	0.00	0.00	18 (2000–2017)
Qatar	0.00	0.00	NA	0.00	0.00	0.00	18 (2000–2017)
Tunisia	1.64	0.00	0	0.00	0.00	0.00	18 (2000–2017)
Total	**47.86**	**400.00**					

* Countries that have not reported any forest areas disturbed by severe weather are not included in the table.

NA = not applicable.

Trends: 16 countries in the NENA region did not report on this variable. The incomplete nature of the dataset does not allow projections to be made.

7.4 Fire

According to the FRA 2020 main report, the global burned area averages 400 million ha over the period 2001–2017 of which 29 percent was in tree covered areas. The areas burned do not always represent damage or loss, as many wildfires, especially in African settings – where more than two-thirds of wildfires occur – are associated with open vegetation types that burn cyclically as low-intensity grass fires.

Status: Ten NENA countries, accounting for 80.7 percent of the 2015 forest area of the NENA region, reported on total land area affected by fire. Three countries (Mauritania, Saudi Arabia and Tunisia), accounting for 4.8 percent of the 2015 regional forest area, provided complete time series for the period 2000–2017.
Nine countries, accounting for 46.1 percent of the region's forest area in 20215, reported on forest area affected by fire. Five of the reporting countries (Bahrain, Mauritania, Morocco, Qatar and Tunisia), accounting for 15.9 percent of the 2015 regional forest area, provided complete time series for the period 2000–2017. This information is summarized in Table 51.

Table 51. Forest area affected by fire by country (2015 baseline)

Reporting country	% of total forest area 2015	Forest area affected by fire 2015		Forest area affected annually 2000–2017 ('000 ha)			Number of data values 2000–2017
		('000 ha)	% of forest area	Maximum	Minimum	Average*	
Algeria	4.63	No data	No data	48.75	5.44	14.99	10 (2003–2012)
Bahrain	0.001	0.00	0.00	0.00	0.00	0.00	18 (2000–2017)
Iran (Islamic Republic of)	25.28	4.79	0.04	27.52	0.15	3.94	15 (2003–2017)
Lebanon	0.33	0.06	0.04	0.38	0.01	0.09	10 (2008–2010)
Mauritania	0.80	0.47	0.14	4.52	0.09	1.05	18 (2000–2017)
Morocco	13.44	0.99	0.02	8.90	0.99	3.50	18 (2000–2017)
Oman	0.01	0.00	0.00	0.00	0.00	0.00	8 (2010–2017)
Qatar	0.00	0.00	NA	0.00	0.00	0.00	18 (2000–2017)
Tunisia	1.64	5.04	0.73	15.97	0.03	2.44	18 (2000–2017)
Total	**46.14**	**11.35**	**0.06****				

* Maximums, minimums and averages are for the periods indicated in the last column.

** The total percentage is based on the 2015 forest area of eight countries only – i.e., it does not include Algeria owing to lacking data for 2015. NA = not applicable.

The eight countries in Table 51 that reported for 2015 state that 11 350 ha, equivalent to 0.06 percent of the forest area area in the eight countries, was affected by fire.

Trends: Owing to missing data, it is not possible to provide a complete overview of the development of burned areas, including in the NENA region, for the period 2000–2017. Only Mauritania and Tunisia provided complete datasets for both total area affected by fire and forest areas affected by fire for the entire period.

For three countries (the Islamic Republic of Iran, Mauritania and Tunisia), accounting for 27.7 percent of the NENA forest area in 2015, the time series for total area burned and forest area burned is available for the period 2003–2017. The reported annual burned areas for the reporting period 2003–2017 are shown in Figure 23 and Table 52.

Figure 23. Annual burned area in the Islamic Republic of Iran, Mauritania and Tunisia, 2003–2017

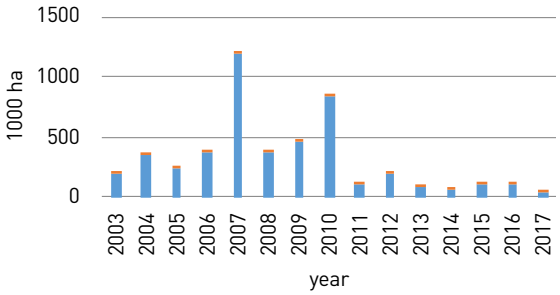


Table 52. Burned area in the Islamic Republic of Iran, Mauritania and Tunisia, 2003–2017

Year	Total area affected by fire ('000 ha)			Forest area affected by fire ('000 ha)			Burned area	Non-forest burned area	Forest area burned	% of burned area that is forest
	Iran (Islamic Republic of)	Mauritania	Tunisia	Iran (Islamic Republic of)	Mauritania	Tunisia				
2003	165.58	39.12	0.15	0.79	0.19	0.12	204.85	203.75	1.1	0.5
2004	183.25	167.31	0.1	0.17	0.83	0.05	350.66	349.61	1.05	0.3
2005	113.82	140.2	0.35	0.65	0.7	0.22	254.37	252.8	1.57	0.6
2006	157.52	244.21	0.11	27.52	1.12	0.03	401.84	373.17	28.67	7.1
2007	294.57	905.56	0.46	0.58	4.52	0.36	1 200.59	1 195.13	5.46	0.5
2008	21.34	350.39	0.48	1.02	1.75	0.32	372.21	369.12	3.09	0.8
2009	142.98	326.28	0.08	1.34	1.63	0.06	469.34	466.31	3.03	0.6
2010	642.52	203.2	0.7	1.02	1.01	0.67	846.42	843.72	2.7	0.3
2011	98.85	18.23	2.18	3.64	0.23	5.04	119.26	110.35	8.91	7.5
2012	60.99	142.28	2.18	0.35	0.35	1.72	205.45	203.03	2.42	1.2
2013	15.43	71.24	4.19	3.64	0.35	3.42	90.86	83.45	7.41	8.2
2014	19.68	46.9	8.34	8.6	0.23	7.02	74.92	59.07	15.85	21.2
2015	15.01	94.6	5.35	4.79	0.47	5.04	114.96	104.66	10.3	9.0
2016	21.5	97.58	6.18	4.54	0.48	5.81	125.26	114.43	10.83	8.6
2017	9.18	40.22	17.24	4.01	0.22	15.97	66.64	46.44	20.2	30.3

Figure 23 and Table 52 indicate large burned areas in 2007 owing to the large burned areas reported from the Islamic Republic of Iran and Mauritania, and 2010 owing to the high figure reported by the Islamic Republic of Iran. Burned forest as a proportion of burned area ranges widely among the reporting countries and from year to year, likely as a result of different predominant land covers and agricultural and fire management practices. Mauritania reports that an average of 0.5 percent of the area of wildfires each year is in forested land. For the Islamic Republic of Iran, an average of 3 percent of the area that is burned each year is forested.

The small fraction of annual burned area that is made up by forest reflects the low forest cover of the NENA region and the fact that most fires occur outside forests. However, there

is a tendency for forest area to make up an increasing proportion of the annual burned areas in recent years, especially in Tunisia. The box on Tunisia and wildfires provides some background on this trend.

Owing to the incomplete nature of the datasets it is not possible to define regional trends and make projections. With a climate that is likely to become drier and warmer, wildfires are likely to continue affecting vegetation in the region.

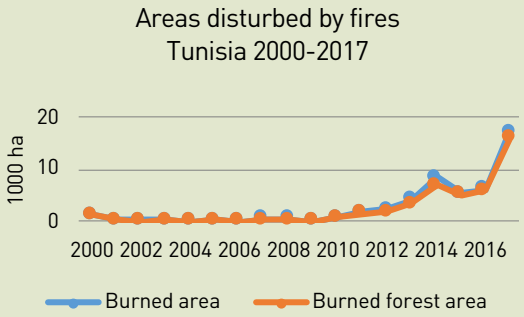
7.5 Other forms of disturbance

FRA 2020 reports do not provide separate numerical information on areas affected by other agents of disturbance. A number of countries have however provided comments that highlight causes of damage other than insects, disease and fire.

Conflict: Many countries in the NENA region are troubled by armed conflict, which have profound implications for the sustainable management of natural resources including forests (see Boxes 2 and 3).

Box 2. Tunisia and wildfires

For individual countries with complete datasets, such as Tunisia, the data on burned areas reflect current events. The Tunisian FRA 2020 report states that the annual increase in forest areas burned after the revolution of 2011 is caused by fires that are intentionally started in the coastal forests to recover land for construction and, in other parts of the country, to expel terrorists. This provides an explanation for the high proportion (89 percent) of the area affected by Tunisian wildfires that is reported in forests between 2000 and 2017.



Box 3. Impact of conflict on forest in Iraq

"Forests are one of the most important natural resources in Iraq. There are different types of forests area distributed in the north, middle , and south of Iraq. Iraq witnessed rapid events through the number of wars that took place, resulting in a deterioration of vegetation, especially forests. Due to the latest war with ISIS, thousands of hectares were lost". (Atzberger, 2020)

A 2020 remote sensing study commissioned by FAO's regional office for the Near East and North Africa (Alzberger, 2020) studied the impact on vegetation in conflict zones in Iraq, Lebanon, Libya, the Sudan, the Syrian Arab Republic and Yemen. The study confirmed a strong correlation between the intensity of conflicts and the degree of long-term degradation of forests and grasslands in conflict zones, with the Syrian Arab Republic being most heavily affected.
Armed conflict has detrimental effects on almost every aspect of sustainable forest management including, but not limited to, the degree of outreach to rural communities, law enforcement, the monitoring of forest resources, and the occurrence of fires and the ability to control them. It also has detrimental effects on the accessibility of the woody resources. In the context of monitoring and reporting on forest resources, countries affected by conflict have to rely on old (pre-conflict) data.
Invasive species: Only the Saudi Arabia national FRA report indicates severe pressure from two species of prickly pear (*Opuntia* sp.) in the mountains of Fayfa, with greatest problems arising from *O. dillenii*.

OTHER AGENTS OF DAMAGE

The Sudan reports:

- major damage to forest areas from browsing camels and goats and the cutting of branches to make cattle enclosures;
- siltation as a major cause of serious disturbance in *Acacia nilotica* habitats, resulting in dieback, decline in the survival rates of newly planted seedlings, blockage of drainage systems and loss of boundary pillars;
- the erosion of riverbanks affecting 3 percent, 10 percent and 35 percent of riverine forests in Gezira, Sennar and Blue Nile States, respectively, while dieback has been found in 11 riverine forests in Sennar and seven forests in the Blue Nile states.

The Islamic Republic of Iran reports:

- wildlife (e.g., porcupines) and parasitic plants such as *Viscum* sp. as agents of damage in forest areas.

7.6 Forest degradation

FRA 2020 collected information on forest degradation by asking countries to report whether they monitored degradation of forests and, if so, to provide information on the national definition of degraded forest, the variables monitored and the methodology.
Monitoring changes in forest quality/forest degradation is an essential part of sustainable forest management as it affects the productivity of the forests. Forest degradation can also negatively affect other adjacent land use, for example by affecting downstream water quality. As countries apply different definitions of degraded forest, quantitative analysis based on the data is not possible. The current section therefore provides only an overview of the reports received relating to forest degradation.

Status: Six countries (Algeria, the Islamic Republic of Iran, Mauritania, Saudi Arabia, the Sudan and the Syrian Arab Republic), accounting for 79.2 percent of the forest area of the NENA region, reported that they monitored forest degradation. The criteria used in national definitions and the monitoring methods used are presented in Figures 24 and 25. Reporting countries can use several criteria to define degraded forest and a number of methods to monitor degradation so the totals shown in the figures may not tally with the number of reporting countries.
The challenge of defining and monitoring forest degradation is global. Unlike land cover and land-use changes, which are more abrupt and easier to monitor via remote sensing, forest degradation is a gradual process that requires monitoring over time for detection and quantification. For the NENA region, the reported monitoring methodologies appear generally to be unsystematic with the most commonly reported methodology being "not specified/under development" (for four out of six responses).

Trends: The forest degradation variable does not include a timeline and is based on few observations. It is therefore not possible to describe a trend based on the data. The low level of response on the degradation variable indicates a lack of national definitions and monitoring mechanisms. There may have been a lack of clarity on how to respond on the forest degradation variable. Some countries reported on the measures needed in order to restore the degraded forest rather than on the methodology for monitoring forest degradation. This could serve as an encouragement for the harmonization of future FRA reporting on the variable.

Figure 24. Criteria used in national definitions of degraded forests in the NENA region

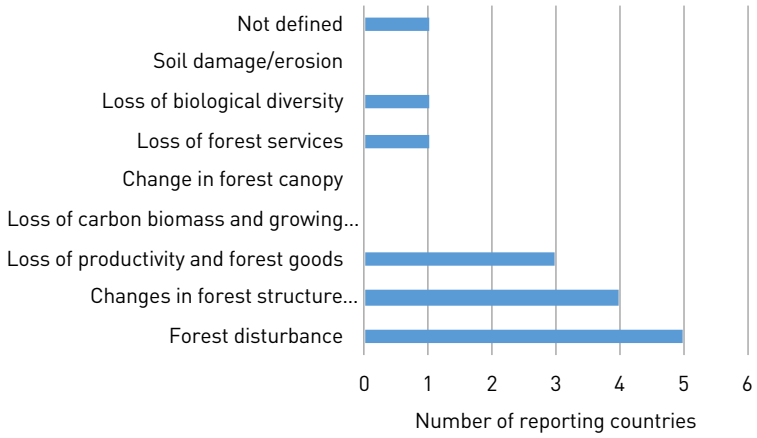
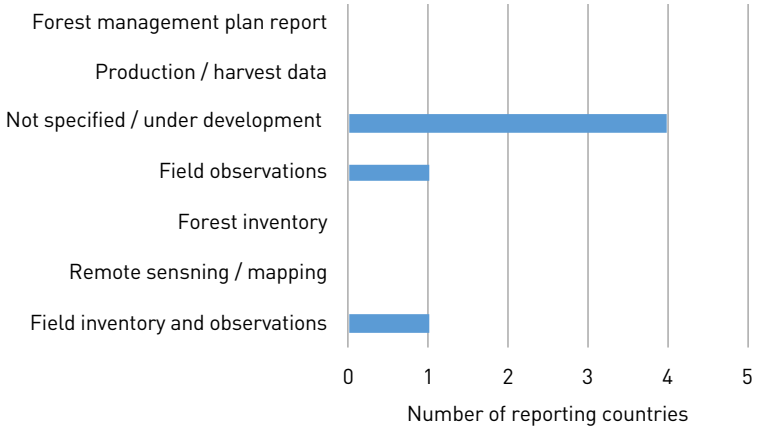


Figure 25. Methods applied by countries for monitoring degraded forests



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CHAPTER 8

POLICY AND LEGISLATION

CHAPTER 8

Policy and legislation

Policy and legislation – FRA 2020 definitions
Policies supporting sustainable forest management: Policies that explicitly encourage sustainable forest management.
Legislation and/or regulations supporting sustainable forest management: Legislation and regulations that govern and guide sustainable forest management operations and use.
National stakeholder platform: A recognized procedure that a broad range of stakeholders can use to provide opinions suggestions, analysis, recommendations, and other input into the development of the national forest policy.

Traceability systems for wood products
Systems that provide the ability to trace the origin, location and movement of wood products by means of recorded identifications. This involves two main aspects:
1. identification of the product by marking;
2. recording of data on the movement and location of a product all the way along the production, processing and distribution chain.

(FAO, 2018a)

8.1 Findings

On variables related to policies and legislation, FRA 2020 received responses from 14 countries accounting for 98.6 percent of the forest area of the NENA region. Most of the countries that did not report on these variables have small areas of forest. The variables require yes/no responses and cover the current status of policies, legislation, platforms and systems related to the promotion of sustainable forest management at the national and subnational levels.

The results are summarized as follows and in Table 53:

- Policies, legislation and regulations are in place at the national level in all reporting countries with forest areas of more than 100 000 ha, except Iraq and Yemen.
- Half of the reporting countries (seven countries, accounting for 49.5 percent of the region's forest area) have existing platforms that allow stakeholder participation in forest policy development at the national and subnational levels.
- Existence of traceability systems for wood products is reported by only three countries: Algeria, Saudi Arabia and the Syrian Arab Republic.

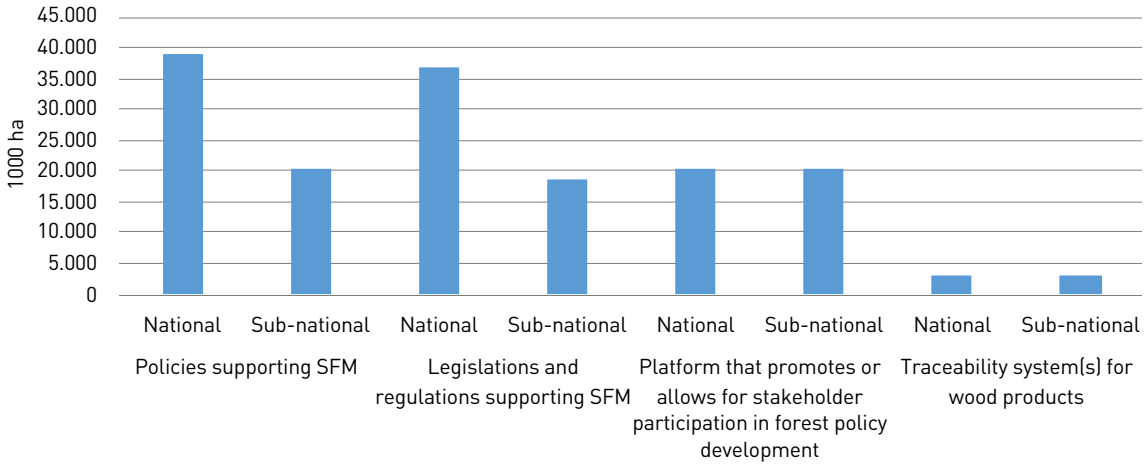
Table 53 and Figure 26 illustrate the forest areas covered by the different variables.

Table 53. Policies and legislation for sustainability, wood traceability and stakeholder involvement

Reporting country	Policies supporting SFM		Legislation and regulations supporting SFM		Platform that promotes or allows stakeholder participation in forest policy development		Traceability system(s) for wood products	
	National	Subnational	National	Subnational	National	Subnational	National	Subnational
Algeria	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Iran (Islamic Republic of)	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Iraq	No	No	No	No	No	No	No	No
Jordan	No	No	Yes	Yes	No	No	No	No
Lebanon	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Mauritania	Yes	Yes	Yes	Yes	No	No	Yes	No
Morocco	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Oman	Yes	No	Yes	No	Yes	No	No	No
Qatar	No	No	No	No	No	No	No	No
Saudi Arabia	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sudan	Yes	No	Yes	No	No	No	No	No
Syrian Arab Republic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tunisia	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Yemen	No	No	No	No	No	No	No	No
Number of "yes" countries	**9**	**7**	**9**	**7**	**7**	**6**	**3**	**2**
Forest area (2020) in "yes" countries ('000 ha)	**38 941**	**20 579**	**36 992**	**18 630**	**20 269**	**20 266**	**3 239**	**2 926**
"Yes" countries as % of forest area of all reporting countries	**95.1**	**50.3**	**90.4**	**45.5**	**49.5**	**49.5**	**7.9**	**7.1**

* Countries that have not reported on policy and legislation, national stakeholder platforms and traceability systems are not included in the table. SFM = sustainable forest management.

Figure 26. Forest area covered by sustainable forest management policies and legislation, wood traceability systems and stakeholder involvement, 2015



At the national level throughout the NENA region, various policies, frameworks and initiatives govern forest management. The box 4 on policies and legislation in Lebanon provides an example of national level strategies and programmes.

Box 4. Policies and legislation promoting sustainable forest management in Lebanon

According to the FRA 2020 country report the following policies, frameworks and initiatives govern forest management in Lebanon.

National strategy for the agriculture sector for the period 2015–2019: The Ministry of Agriculture of Lebanon, with support from the Agriculture and Rural Development Programme funded by the European Union, prepared a strategy for the period 2015–2019, which aims to address agricultural challenges, enhance food safety and improve the contribution of the agriculture sector to national GDP. The general objective of the strategy is to develop institutional capacities, empower the Ministry of Agriculture and allow it to overcome agricultural challenges, improve the contribution of agriculture to the economic and social development of the country, and promote the sustainable management of natural resources. In the third course of action in the strategy – improve the good governance and sustainable use of natural resources – five areas of intervention were identified:

- strengthening good management and sustainable use of forests;
- promoting sustainable investment and management of pastureland;
- improving the management of medicinal and aromatic plants and wild fruit trees;
- supporting investment in fisheries and aquaculture and improving the sustainable management of the sector;
- modernizing the irrigation system in Lebanon and promoting the use of alternative sources of water and energy in agriculture.

National Forest Programme: In June 2015, the Ministry of Agriculture launched the main instrument of the national forest policy for upcoming decade 2015–2025 decade – the country's first national forest programme. The programme identifies the Government's interventions in the forest sector and beyond, aiming at the sustainable management of Lebanon's forest resources, while defining coordination and cooperation mechanisms among all public and private sectors.

National Afforestation and Reforestation Programme 2012: Also known as the Roadmap for 40 Million Trees, the programme was developed by the Ministry of Agriculture with FAO's assistance. It aims at restoring and developing forest land and tree cover to increase forest cover from 13 percent of Lebanon's total area to 20 percent over 20 years. This objective will be achieved by planting 40 million forest trees.

The National Strategy for Forest Fire Management was approved by the Council of Ministers through Resolution No. 52 of 13 May 2009.

8.2 Area of permanent forest estate

Seven countries, accounting for 87.6 percent of the NENA forest area, reported on forest areas designated as permanent forest. In 2020 an average of 82.2 percent of the forest area of the reporting countries is designated as permanent, as shown in Table 54 and Figure 27.

Permanent forest estate – FRA 2020 definition

Forest area that is designated to be retained as forest and may not be converted to other land use. (FAO, 2018a)

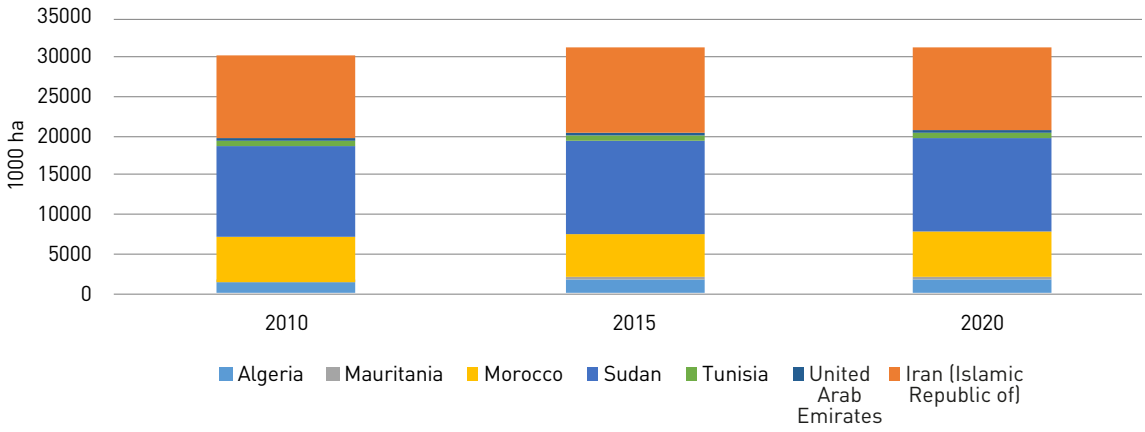
Table 54. Permanent forest area by country, 1990–2020

Reporting country*	% of forest area 2020	Permanent forest area ('000 ha)					Decade change ('000 ha)		
		1990	2000	2010	2015	2020	1990–2000	2000–2010	2010–2020
Algeria	98.4	1 492	1 492	1 492	1 918	1 918	0	0	426
Iran (Islamic Republic of)	100	--	--	10 692	10 692	10 752	--	--	59.89
Mauritania	29.1	60	71	83	89	91	11	12	8
Morocco	100	5 485	5 507	5 675	5 685	5 742	21.25	168.03	67.92
Sudan	64.5	4 187	9 694	11 449	11 849	11 849	5 506.73	1 755	400
Tunisia	99.0	644	668	685	691	696	23.86	17.34	10.81
United Arab Emirates	100	245	310	317.3	317.3	317.3	65	7.3	0
Total	**82.2**	**12 114**	**17 741**	**30 393**	**31 241**	**31 366**	**5 627.84**	**12 651.65**	**972.62**

* Countries that have not reported on the variable "permanent forest areas" are not included in the table.

There are significant differences among reporting countries. The NENA Sahel countries (Mauritania and the Sudan) have significantly lower percentages of permanent forest (29.1 percent in Mauritania and 64.5 percent in the Sudan) than the others, which report 100 percent or very close to 100 percent of their forest area as being permanent. It is characteristic of the region that the area of permanent forest is increasing throughout the three decades. No country reports a decline during the period 1990-2020. The Islamic Republic of Iran's figures for permanent forest area are available from 2010 only. The total figures of the reporting countries are therefore comparable only for the last decade. Figure 27 shows the development of the permanent forest estate in the reporting countries over the most recent decade.

Figure 27. Permanent forest estate in the NENA region, 2010–2020



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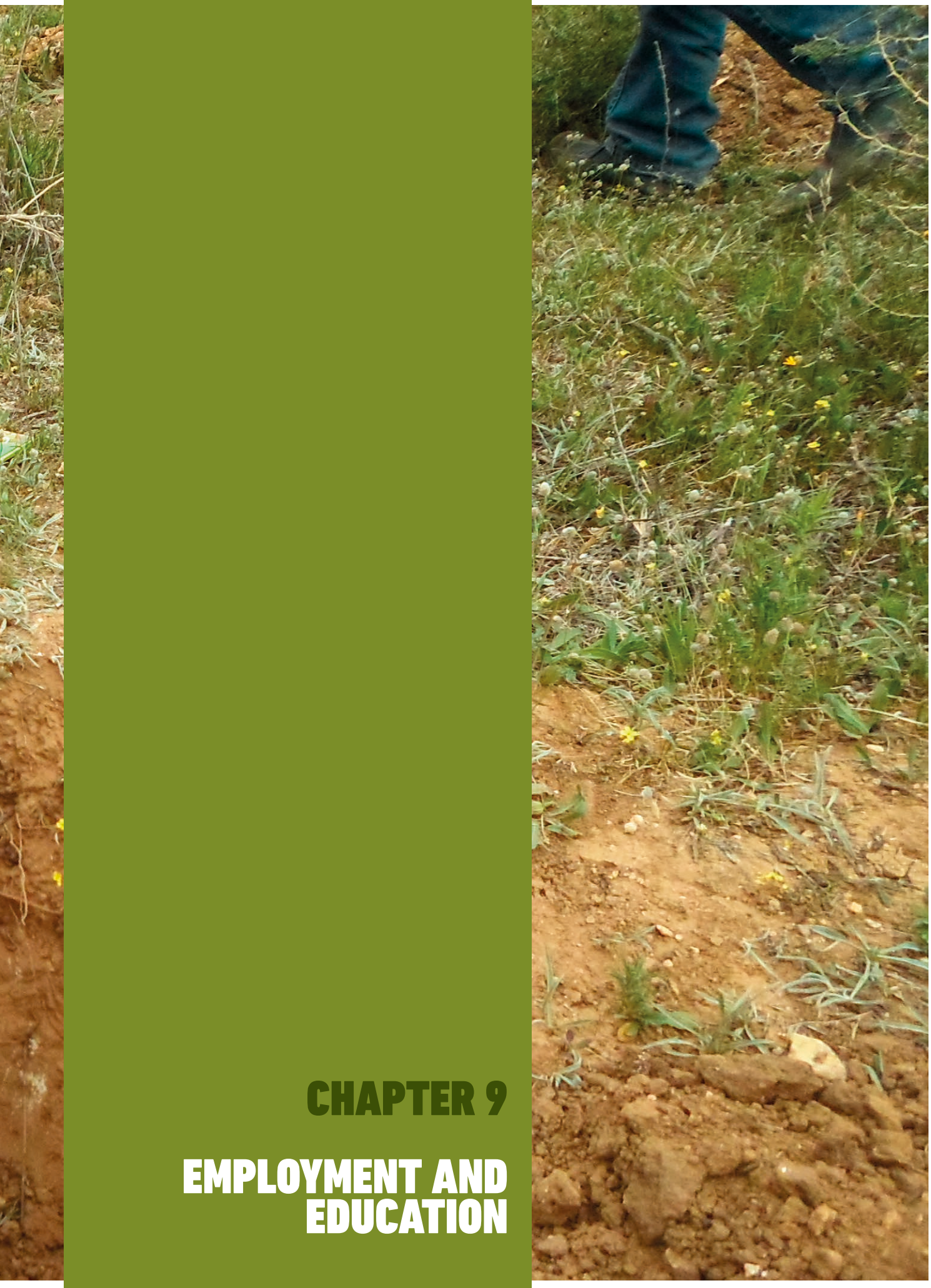


CHAPTER 9

EMPLOYMENT AND EDUCATION

CHAPTER 9

Employment and education

9.1 Employment in forestry and logging

Employment in forestry and logging – FRA 2020 definition

Employment in activities related to production of goods derived from forests. This category corresponds to the ISIC/NACE [International Standard Classification/Nomenclature of Economic Activities] Rev. 4 activity A02 (Forestry and logging). (FAO, 2018a)

FRA 2020 includes variables on employment in forestry and logging because they provide an important indicator of the impact of forests on people, which helps to quantify the contribution of the sector to broader economic objectives. Most forestry activities occur in rural areas that are often poorer than average. This indicator therefore helps in measuring the contribution of the forestry sector to poverty alleviation. According to the International Labour Organization (ILO, 2011), 13.7 million people were formally employed in the forestry sector in 2011 corresponding to 1 percent of the global workforce. FRA 2020 estimated the global total for employment in forestry to be 12.5 million people in full-time equivalent (FTE) in 2015, of whom 90 percent were reported in Asia and Africa. Actual employment is however probably much larger owing to widespread informal employment, especially in developing countries.

Status: FRA 2020 reports on employment in forestry and logging broken down by gender, reporting year (1990, 2000, 2010 and 2015) and subcategory (see Table 55). There are four subcategories:

1. silviculture and other forestry activities;
2. logging;
3. gathering of NWFPs;
4. support services.

Eleven countries, accounting for 96.9 percent of the 2020 NENA forest area, reported on employment in forestry and logging:

- Seven of these countries, accounting for 91.7 percent of the 2020 NENA forest area, reported complete time series broken down by gender.
- Two countries (the Syrian Arab Republic and Tunisia), accounting for 2.9 percent of the NENA 2020 forest area, reported complete time series without gender breakdown.
- Two countries (Iraq and Jordan), accounting for 2.2 percent of the NENA forest area, reported partial time series. The figures from Iraq were broken down by gender.
- Eight countries, accounting for 93.7 percent of the NENA forest area, reported gender-disaggregated data for employment for 2015.

Table 55. Employment in forestry and logging by country and by gender, 1990–2015

Reporting country*	1990 ('000 FTE)**			2000 ('000 FTE)			2010 ('000 FTE)			2015 ('000 FTE)		
	Total	Female	Male	Total	Female	Male	Total	Female	Male	Total	Female	Male
Algeria	48.0	8.0	40.0	49.0	9.0	40.0	59.0	11.0	48.0	62.0	10.0	52.0
Iran (Islamic Republic of)	65.8	4.6	61.2	52.8	6.3	46.4	14.4	2.0	12.4	10.8	1.7	9.2
Mauritania	7.2	0.1	7.1	6.1	0.2	5.9	5.5	0.3	5.2	3.5	0.4	3.1
Morocco	82.7	32.2	50.5	116.6	55.6	60.9	110.7	59.3	51.4	105.0	63.0	42.1
Qatar	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Saudi Arabia	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.1
Sudan***	1 005.2	750.8	504.4	1 205.1	900.7	304.4	1 200.0	826.9	303.1	1 255.2	937.8	317.4
Syrian Arab Republic	31.0	--	--	23.0	--	--	19.0	--	--	87.0	--	--
Tunisia	26.7	--	--	35.0	--	--	26.6	--	--	12.1	--	--
Jordan	0.44	--	--	0.72	--	--	--	--	--	--	--	--
Iraq	--	--	--	--	--	--	--	--	--	0.33	0.13	0.2

* Countries that have not reported on employment in forestry and logging are not included in the table.

** FTE = full-time equivalent.

*** There is an error in the dataset for the Sudan for 1990 and 2010 as the gender-disaggregated figures do not tally with the total (difference of 250 000).

-- = no country data submitted.

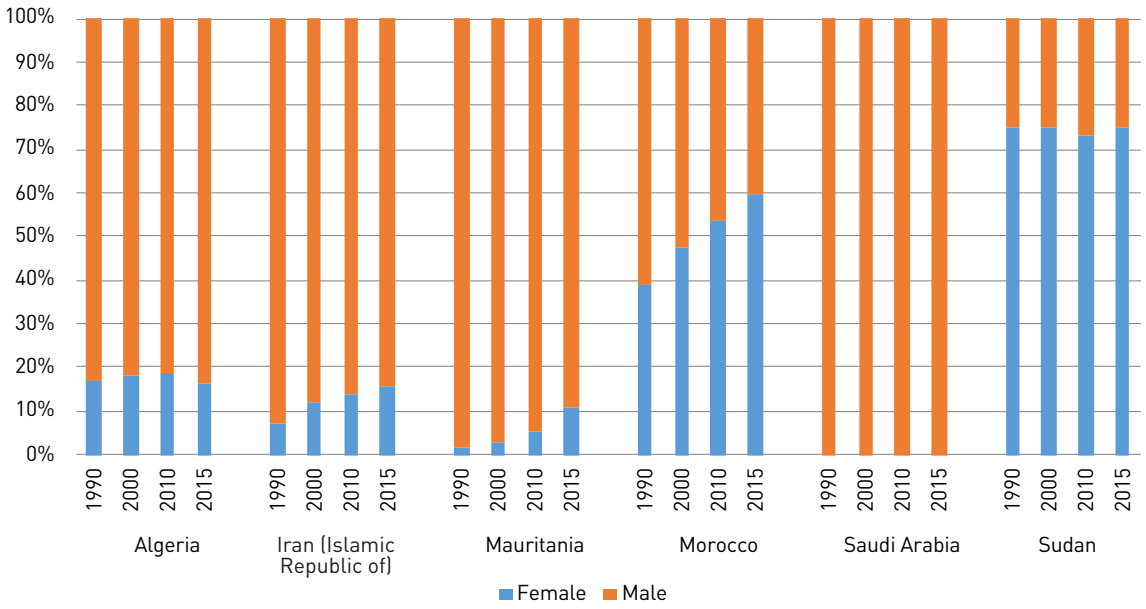
Trends: An important feature of the data on forestry and logging employment is the relative magnitude of the figures from the Sudan, which constitute between 79 and 84 percent of the total, depending on the year. Owing to differences in the amounts reported in country reports, missing data from some countries and different trends at the country level regarding gender and employment, the discussion of trends focuses on countries with datasets that allow analysis of employment over time and gender. Qatar has been omitted as it reported zero values for employment. Between 1990 and 2015, the following changes are reported for employment in forestry and logging:

- Three countries reported decreases: the Islamic Republic of Iran (-83.6 percent), Mauritania (-52.1 percent) and Tunisia (-54.8 percent).
- Five countries reported increases: Algeria (29.2 percent), Morocco (26.9 percent), Saudi Arabia (100 percent), the Syrian Arab Republic (180.6 percent) and the Sudan (24.9 percent).
- The data entry error of 250 000 FTE for total employment in the Sudan (see Table 55) in 1990 is not included in the following analysis.

The submitted datasets that allow for disaggregation of gender over time are presented in aggregate in Table 56 and by country in Figure 28. Five of the six countries report increasing proportions of women in forestry employment during the period 1990–2015, especially in:

- Morocco, which reports an increase from 39 percent in 1990 to 60 percent in 2020;
- the Sudan, which reports more women than men employed in forestry, with women accounting for about 75 percent of forestry employment in all reporting years.

Figure 28. Percentages of male and female employment in forestry and logging in six countries, 1990–2015



Four countries (Algeria, Mauritania, Saudi Arabia and the Sudan), accounting for 63.5 percent of the total NENA forest area, provided a further breakdown of employment in forestry into the four subcategories of forestry employment. The aggregated data are shown in Table 56. The bulk of female employment is reported in subcategories 1 (silviculture) and, particularly, 3 (NWFP gathering).

Table 56. Forestry employment by year, gender and employment subcategory in four countries, 1990–2015

FRA 2020 employment subcategory*	1990 ('000 FTE)		2000 ('000 FTE)		2010 ('000 FTE)		2015 ('000 FTE)	
	Female	Male	Female	Male	Female	Male	Female	Male
1. Silviculture	16.7	56.2	39.1	65.6	42.8	60.1	43.1	49.9
2. Logging	0.0	17.5	0.0	17.1	0.0	16.9	0.0	15.0
3. NWFP gathering	774.1	266.2	926.2	316.4	854.3	318.3	967.7	335.2
4. Support services	0.3	12.2	0.4	12.2	0.4	12.4	0.4	14.6
Total	**791.2**	**352.0**	**965.6**	**411.2**	**897.5**	**407.7**	**1011.2**	**414.6**
1. Silviculture	23%	77%	37%	63%	42%	58%	46%	54%
2. Logging	0%	100%	0%	100%	0%	100%	0%	100%
3. NWFP gathering	74%	26%	75%	25%	73%	27%	74%	26%
4. Support services	3%	97%	3%	97%	3%	97%	3%	97%
% female employment including NWFPs	**69**		**70**		**69**		**71**	
% female employment excluding NWFPs	**17**		**29**		**33**		**35**	

* Figures are based on FRA 2020 data received from Algeria, Mauritania, Morocco and the Sudan, accounting for 63.5 percent of the NENA region's forest area.

The large figures for NWFP gathering reported from the Sudan dominate the statistics. As a result, the aggregated figures for the four countries indicate a high proportion of female employment and a small increase in female employment from 69 percent in 1990 to 71 percent in 2015.
When NWFP-gathering is excluded from the overall employment figures for the four countries, the trend is for a lower proportion of female employment in forestry and a more significant increase from 17 percent in 1990 to 35 percent in 2015. This may be more representative of the trend in formal employment, as a large part of NWFP gathering is informal.
Although no female employment is reported in subcategory 2 (logging), the figures seem to indicate that employment in forestry is moving towards a better gender balance in the four reporting countries. Reporting results by country are illustrated in Figures 29, 30, 31 and 32.

Figure 29. Forestry and logging employment by gender in Algeria, 1990–2015

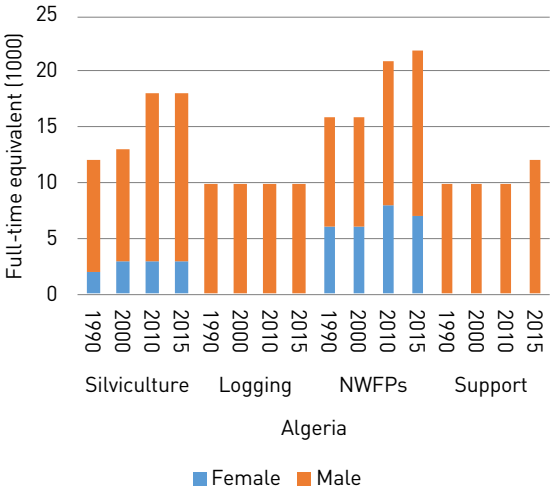


Figure 30. Forestry and logging employment by gender in Mauritania, 1990–2015

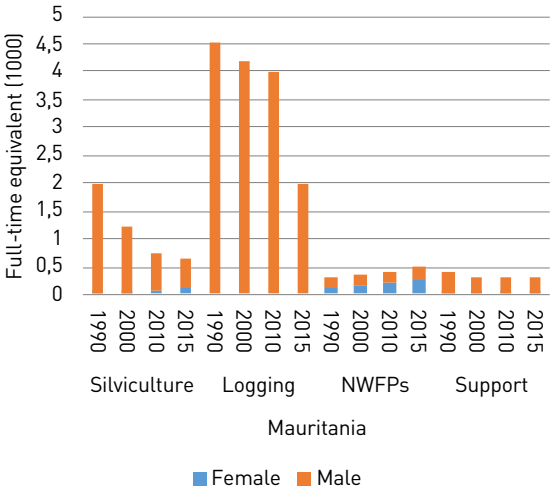


Figure 31. Forestry and logging employment by gender in Morocco, 1990–2020

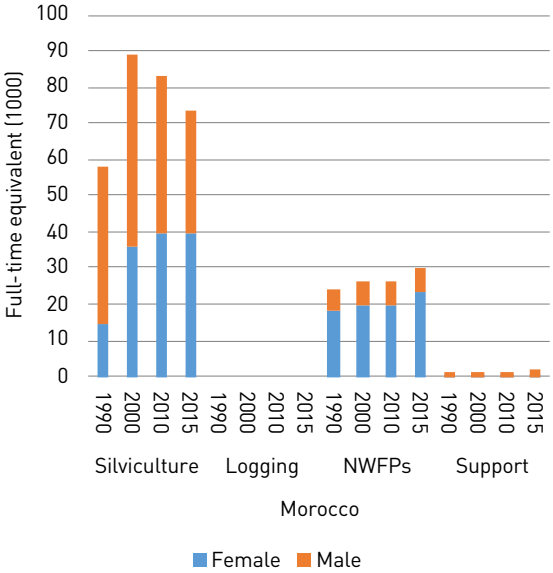
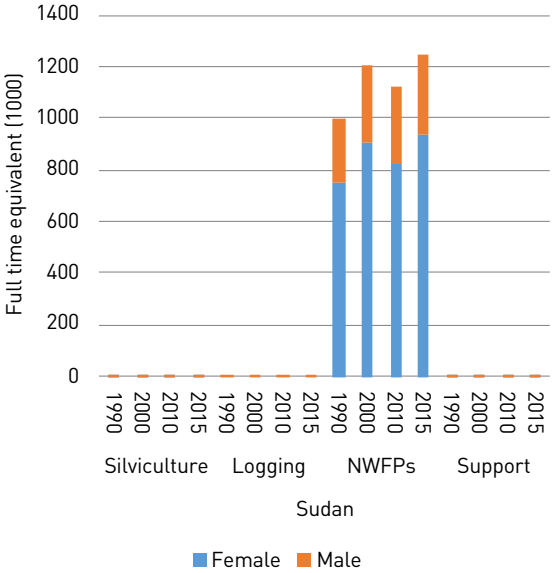


Figure 32. Forestry and logging employment by gender in the Sudan, 1990–2020



Subcategory 3 (gathering of NWFPs) has an especially large impact on the reported increase in women's employment because of the magnitude of the figures from the Sudan.
Gender specific uses of forest resources are well documented, with men often more involved in income-generating activities such as logging and charcoal production, and women more involved in activities that meet the needs of the household (gathering NWFPs and collecting fuelwood). National statistics often cover only formal employment in forestry and not informal work such as NWFP gathering. Ensuring harmonized reporting practices across reporting countries on such difficult variables could be a focus area for future FRA work.

9.2 Forest related education

Countries reported to FRA 2020 on forest-related education, which can be an indicator of national capacity for, and commitment to, the management, conservation and enhancement of forests and the building of institutional frameworks that promote sustainable forest management.

In total ten countries, accounting for 92 percent of the region's forest area, reported on forestry education, with two countries (Oman and Qatar) reporting zero values and two (the Islamic Republic of Iran and the Syrian Arab Republic) providing total figures only from 2015, with no breakdown by gender. Country reports for FRA 2020 on forestry graduates for the period 1990–2015 are summarized in Table 57.

Table 57. Forest related graduates by country, 1990–2015

Reporting country*	1990			2000			2010			2015		
	Total	Female	Male	Total	Female	Male	Total	Female	Male	Total	Female	Male
Iraq	27	7	20	11	1	10	20	6	14	16	4	12
Mauritania	83	2	81	110	2	108	126	11	115	120	11	109
Morocco	58	0	58	56	0	56	52	4	48	62	22	40
Oman	0	0	0	0	0	0	0	0	0	0	0	0
Qatar	0	0	0	0	0	0	0	0	0	0	0	0
Saudi Arabia	24	2	22	43	6	37	49	7	42	70	10	50
Sudan	140	55	105	291	132	159	307	147	160	342	197	145
Tunisia	22	1	21	158	10	148	168	40	128	118	64	54
Iran (Islamic Republic of)	--	--	--	--	--	--	--	--	--	1 414	--	--
Syrian Arab Republic	31	--	--	23	--	--	19	--	--	87	--	--
Total**	**385**	**67**	**307**	**692**	**151**	**518**	**741**	**215**	**507**	**2 229**	**308**	**410**
% female graduates			**17.9**			**22.6**			**29.8**			**42.9**

* Countries that have not reported any forest related education are not included in the table.

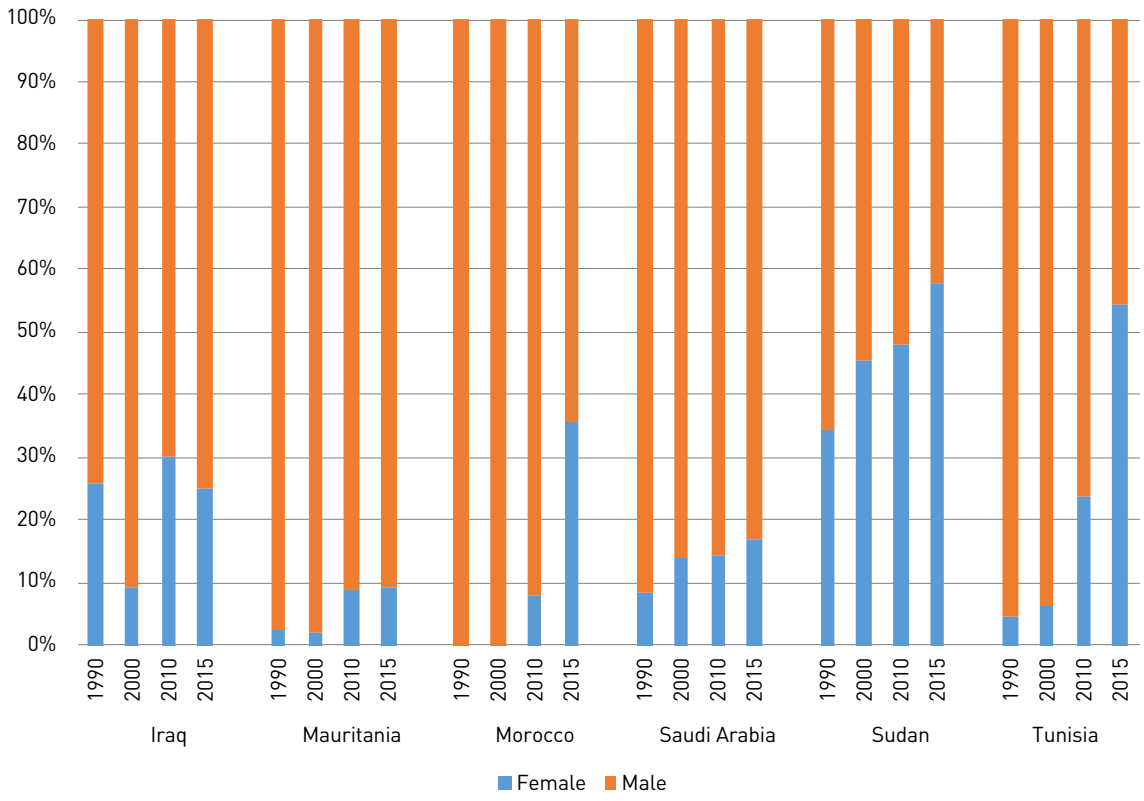
** Owing to the partial datasets from the Islamic Republic of Iran and the Syrian Arab Republic, and reporting errors in some other datasets, the totals do not always tally with the figures by gender. Percentages are calculated from the gender-disaggregated data only.

-- = no data submitted.

A significant rise in the proportion of female graduates in the reporting countries is noted, from 17.9 percent in 1990 to 42.9 percent in 2015. As education leads to employment, this is an indication that employment in forestry is moving towards greater gender balance.

The datasets for Iraq, Mauritania, Morocco, Saudi Arabia, the Sudan and Tunisia, accounting for 65 percent of 2020 NENA forest area, presented in Figure 33 and Table 58, provide a gender breakdown for education in forestry. Five of the six countries report increasing proportions of female graduates. In 2015, the Sudan and Tunisia reported a majority of female forestry graduates.

Figure 33. Percentages of male and female forest related graduates in six countries, 1990–2015



A further breakdown of graduates into the four subcategories of forestry qualification – doctoral degree, master's degree, bachelor's degree and technician's certificate/diploma – from the six countries for the period 1990–2015, is provided by Table 59.

Table 58. Female forest related graduates in six countries, 1990 and 2015

% of female forestry graduates		
Country	1990	2015
Sudan	34	58
Tunisia	5	54
Morocco	0	35
Iraq	26	25
Saudi Arabia	8	17
Mauritania	2	9

Table 59. Forest related graduates by year and subcategory in six countries, 1990–2015

FRA 2020 subcategory*	Number of graduates							
	1990		2000		2010		2015	
	Female	Male	Female	Male	Female	Male	Female	Male
1. Doctoral degree	0	8	3	10	6	17	9	26
2. Master's degree	8	38	8	56	21	53	40	65
3. Bachelor's degree	57	172	138	238	173	213	207	182
4. Technician's certificate/diploma	2	89	2	214	15	212	52	137
Total	**67**	**307**	**151**	**518**	**215**	**495**	**308**	**410**
1. Doctoral degree	0%	100%	23%	77%	26%	74%	26%	74%
2. Master's degree	17%	83%	13%	88%	28%	72%	38%	62%
3. Bachelor's degree	25%	75%	37%	63%	45%	55%	53%	47%
4. Technician's certificate/diploma	2%	98%	1%	99%	7%	93%	28%	72%
% female graduates	**18**		**23**		**30**		**43**	

* Figures in the table are based on FRA 2020 data received from Iraq, Mauritania, Morocco, Saudi Arabia, the Sudan and Tunisia, accounting for 65 percent of forest area in the NENA region.

For the reporting countries, the overall proportion of female forest related graduates has increased significantly from 18 percent in 1990 to 43 percent in 2015. The proportions of female graduates in all subcategories of forestry education also increased between 1990 and 2015, at varying rates:

- In 2015 the majority of graduates at advanced university level were male – 74 percent of those with doctoral degrees and 62 percent of those with master's degrees.
- At bachelor's degree level there was gender parity, with 53 percent female and 47 percent male.
- At the technician level the majority of graduates in 2015 were male – 72 percent.

Although there is not gender parity at all levels of education for the region as a whole, the figures indicate that forest related education is moving towards a more even gender balance in the six reporting countries. There are big differences among reporting countries regarding numbers of graduates and gender distribution. Figures 34–39 illustrate the country-level FRA 2020 figures for forest related education.

Figure 34. Forest related graduates by gender, 1990–2015

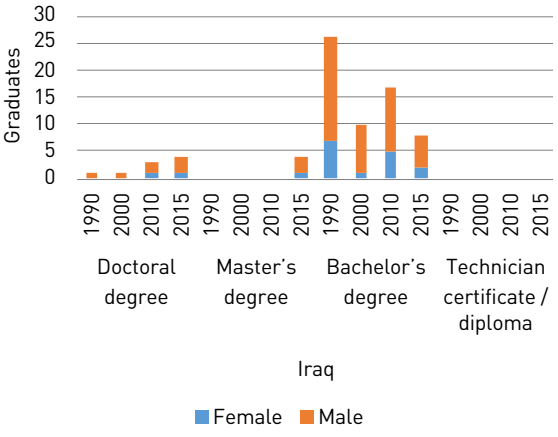


Figure 35. Mauritania – forest related graduates by gender, 1990–2015

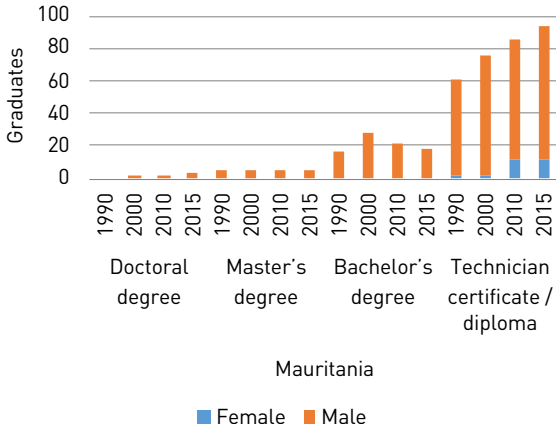


Figure 36. Morocco – forest related graduates by gender, 1990–2015

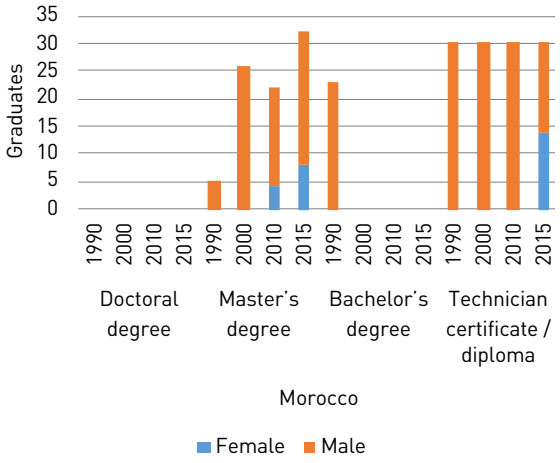


Figure 37. Saudi Arabia – forest related graduates by gender, 1990–2015

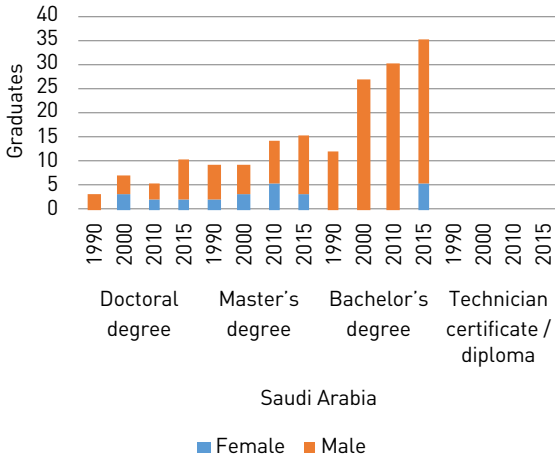


Figure 38. The Sudan – forest related graduates by gender, 1990–2015

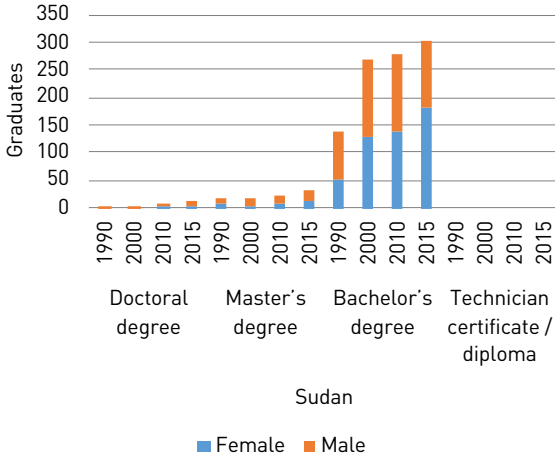
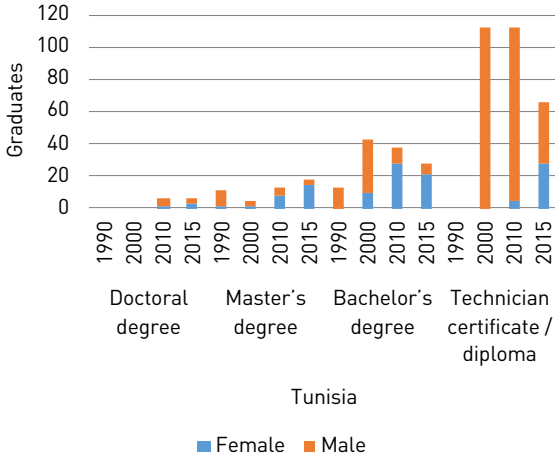


Figure 39. Tunisia – forest related graduates by gender, 1990–2015



As bachelor's degrees prelude advanced university degrees, it is likely that the proportion of female holders of master's and doctoral degrees will increase over time.

While the numbers reported to FRA 2020 describe a generally positive trend regarding gender equity and forestry education, it should be emphasized that the quality of the educational programmes is not considered by FRA.

It is noteworthy that three out of the six countries do not report on graduates at the technician level in 2015. The decrease in trained technical forestry staff is one of the concerns raised by FAO (Hamid, 2015) regarding forestry education in the region and the need to train foresters who are able to meet present and future challenges. Box 5 elaborates further on observed areas in need of further attention.

Box 5. Strengthening forestry education and knowledge in the Near East and North Africa region

A 2015 study on strengthening forestry education and knowledge in the NENA region, commissioned by the FAO Regional Office for NENA (Hamid, 2015) is not part of global FRA reporting but adds valuable qualitative information and points out a number of challenges facing the education of foresters in NENA. Among them are: "inadequate human and physical resources in all institutions, an increase in enrolment with students of low marks compared with other disciplines, change of the role of foresters, decrease in technical education and an increase in professional education, substantial decrease in government employment opportunities and outdated curricula in some institutions".
The report advises that: "the future of forestry education and training needs to move from the concentration on wood production and focus on the needs of societies and encourage participatory forest management through the whole chain of stakeholders. Higher educational institutions need to have more holistic view of education and offer their various educational programmes in an integrated and coordinated manner".
The report raises concerns that: "Governments' capacity to improve this situation is declining every year because of financial constraints, inadequate trained staff and the loss of technical staff through retiring and in some countries emigration".
The report advises that: "The current situation requires a new forester who has the capacity as manager, facilitator, trainer and technician. A forester who is well prepared for the social, environmental and economic responsibilities he/she will face in the field having the following characteristics:

- solid grounding in scientific and technical principles and practical experience;
- social commitment;
- environmental consciousness;
- values and ethics;
- ability to think independently;
- team work;
- initiative and innovative;
- life-long learner;
- communication skills;
- entrepreneurial skills (managerial, market oriented; processing/value-adding);
- leadership skills".

Finally, the report provides the following advice on required interventions:

- "Broaden the concept of forestry as a part of wider concept of natural resources management.
- Create more employment opportunities through the introduction of entrepreneurship and business thinking while developing curricula.
- Improvement/upgrading of Human and physical resources.
- There is a need to reorganize the teaching-learning system and consider the development

of qualifications for continuing learning (keep knowledge updated), such as critical thinking skills, analytical and problem-solving skills, based on real issues.

- Forestry education curricula should respond to the evolving values assigned by society to forests' goods and services.
- There is a need for an interdisciplinary focus in forestry education, connecting subjects in the curricula, including social and economic aspects.
- Forestry education should address the need for an integrated approach, at the technical and policy level, towards management, conservation and sustainable development of all types of forests.
- Forestry education should give attention to the link between forestry and agricultural sustainability, and more specifically between food security and income generation in relation to the livelihoods of different sectors of society.
- The role of foresters should include that of an adviser to forest users and participant in dialogues with stakeholders for which social skills need to be developed".

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CHAPTER 10

NON-WOOD FOREST PRODUCT REMOVALS AND VALUE

CHAPTER 10

Non-wood forest product removals and value

Non-wood forest products (NWFPs) – FRA 2020 definition
Goods derived from forests that are tangible and physical objects of biological origin other than wood.
Value of NWFP is defined as the commercial market value at the forest gate. (FAO, 2018a)

Globally, NWFPs are of large social and economic importance. Reporting on removals of NWFPs is however inherently difficult owing to the largely informal nature of NWFP consumption, the multitude of NWFP products and the lack of reporting and standardization of data. Countries reported to FRA 2020 on NWFP removals and value for up to ten NWFPs each, ranked according to economic value and categorized according to the FAO plant-based and animal-based NWFP categories (Table 60). FRA 2020 uses 2015 as the baseline for reporting on NWFPs.

10.1 Findings

Seven countries, accounting for 93.5 percent of the 2015 NENA forest area, reported on quantities of NWFPs and their value in national currencies. For the purposes of comparison, the values have been converted into United States dollars in the current report. The total value of NWFPs reported to FRA 2020 for 2015 in the seven countries was USD 347.4 million.[1] This is about 4.5 percent of the total global value of NWFPs reported to FRA 2020.

[1] Using exchange rates as of 31 December 2015, available at www.oanda.com

Table 60. Reported values of non-wood forest products in the NENA region by FRA 2020 category, 2015

	Plant-based NWFP category	Value (USD million)		Animal-based NWFP category	Value (USD million)
1.	Food	99.2	9.	Living animals	4.1
2.	Fodder	0.6	10.	Hides, skins and trophies	13.2
3.	Raw material for medicine and aromatic products	131.2	11.	Wild honey and bee-wax	69.3
4.	Raw material for colorants and dyes	--	12.	Wild meat	2.1
5.	Raw material for utensils, handicrafts and construction	14.8	13.	Raw material for medicine	--
6.	Ornamental plants	--	14.	Raw material for colorants	--
7.	Exudates	12.5	15.	Other edible animal products	--
8.	Other plant products	0.3	16.	Other non-edible animal products	--
	Total	**258.7**			**88.7**

-- = no country reported on this NWFP.

Given that the NENA region accounts for only 1 percent of the global forest area, its reported generation of 4.5 percent of the NWFP value is an indication of the importance of NWFPs in the region.

Plant-based NWFPs account for 74 percent of the value of NWFPs in the seven reporting countries, while animal-based NWFPs make up the remaining 26 percent (Figure 40). In comparison, at the global level, the reported proportion of plant-based NWFPs is 80 percent.

Figure 40. Reported non-wood forest product values in seven countries, 2015

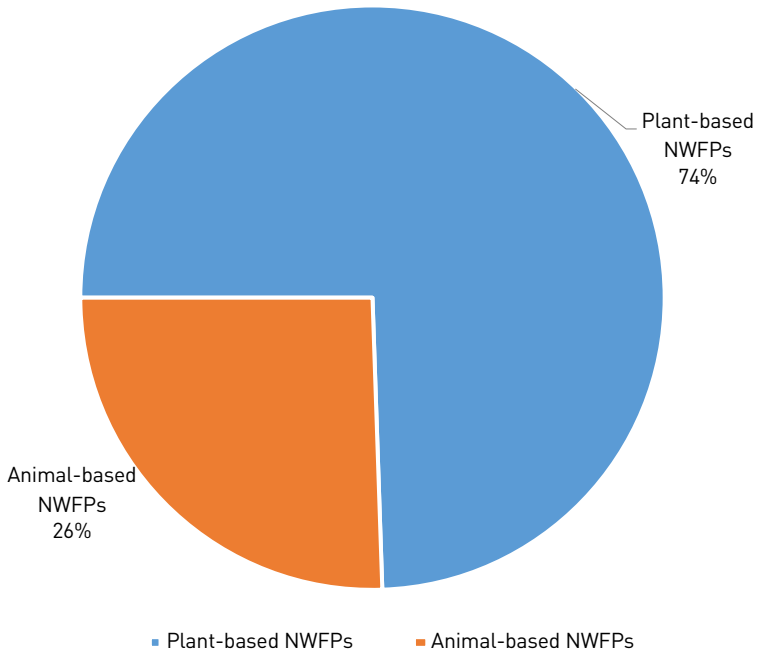
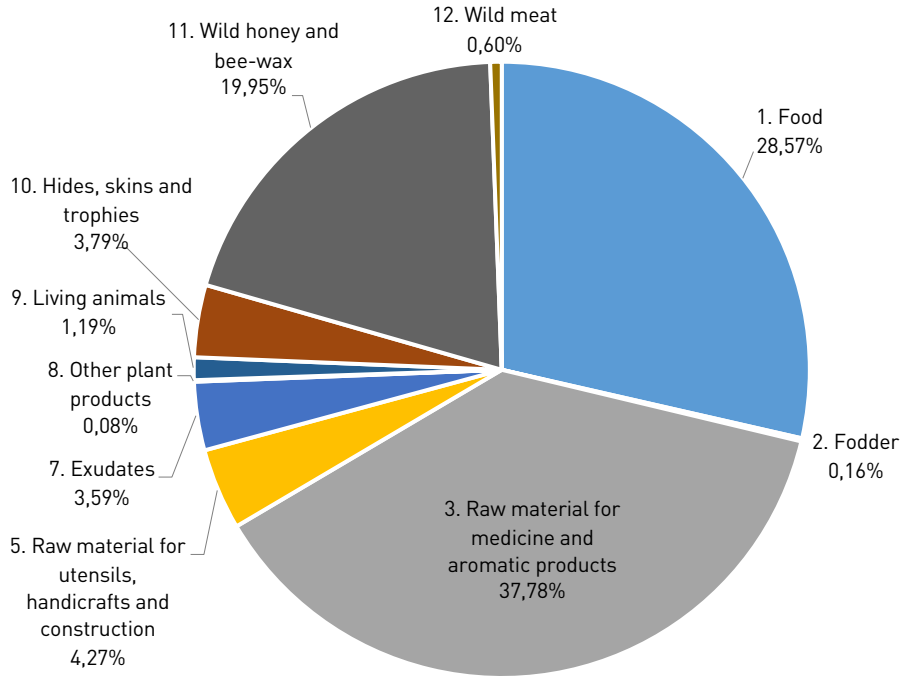


Figure 41. Relative values of non-wood forest products in seven countries, 2015



The NENA countries that reported to FRA 2020 on NWFPs are Algeria, the Islamic Republic of Iran, Mauritania, Morocco, Saudi Arabia, the Sudan and Tunisia. The countries that reported animal-based NWFPs are Saudi Arabia, the Sudan and Tunisia. NWFPs in categories 4, 6, 13, 14, 15 and 16 were not reported by any country in the NENA region.

In Figure 41, the NWFP category that is reported as the most important in terms of value is category 3, "raw materials for medicine and aromatic products", accounting for 38 percent of the total NWFP value, followed by category 1, "food", at 29 percent.

In comparison, at the global level, FRA 2020 ranks NWFP category 1, "food", as the most important (30 percent), followed by category 3, "raw materials for medicine and aromatic products" (14 percent).

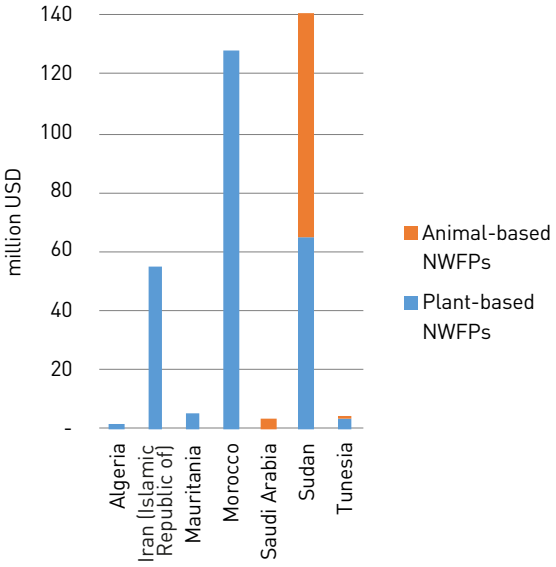
The high value of NWFP category 3 is mainly due to the figures reported from Morocco.

Reporting on NWFP values is dominated by three countries (Figure 42), the Sudan, Morocco and the Islamic Republic of Iran, with distinctly different profiles. The NWFPs reported from the Sudan are 57 percent animal-based (of which 75 percent is honey) and 43 percent plant-based (of which 85 percent is food). Morocco reports 100 percent plant-based NWFPs of which 85 percent are raw material for medicine and aromatic products (covering a range of essential oils, leaves and flowers). The Islamic Republic of Iran also reports 100 percent plant-based NWFPs, with 75 percent falling into the category "food" (including high-value products such as asafoetida, truffles and almonds).

The importance of NWFPs is reflected in the designation of primary management objectives that promote NWFPs (see Section 5.2):

- Saudi Arabia, 100 percent multiple use;
- Morocco, 72-5 percent multiple use and 16 percent production (total 88.5 percent);
- Mauritania, 43.8 percent multiple use and 0.6 percent production (total 44.4 percent);
- Islamic Republic of Iran, 27.9 percent multiple use and 16 percent production (total 43.1 percent);
- Algeria, 27 percent production.

Figure 42. Values of non-wood forest products by country, 2015



In the Sudan and Tunisia the connection between NWFP gathering and primary management objective is less evident:

- In the Sudan, only 0.7 percent of the forest area designated as production forest and no areas under multiple use. However, for 61.4 percent of the forest area no designated primary management objective is reported, and for 37.9 percent biodiversity is reported as the primary management objective. It is likely that the Sudan's large NWFP production (dominated by animal-based products) is mainly from those areas.
- Tunisia reports 89.3 percent of its forest area as primarily for the protection of soil and water and 19.7 percent for the protection of biodiversity.

These observations underscore the versatile nature of SFM, in which a primary management objective does not exclude NWFP activities as long as they are aligned with that objective, such as beekeeping in areas where biodiversity conservation is the primary management objective.

The reported NWFPs reflect the diversity of the NENA region with regards to flora and fauna. For example, Morocco, Tunisia and Algeria all report significant production of cork (from the cork oak *Quercus suber*), the Islamic Republic of Iran reports a number of high-value NWFPs from temperate species, and the Sudan and Mauritania report gum arabic as their most important NWFP.

Figure 43 and Table 61 illustrate the differences among NWFP categories at the country level for the seven countries that reported to FRA 2020 on NWFP removals.

Figure 43. Relative values of non-wood forest products by category and country in seven countries

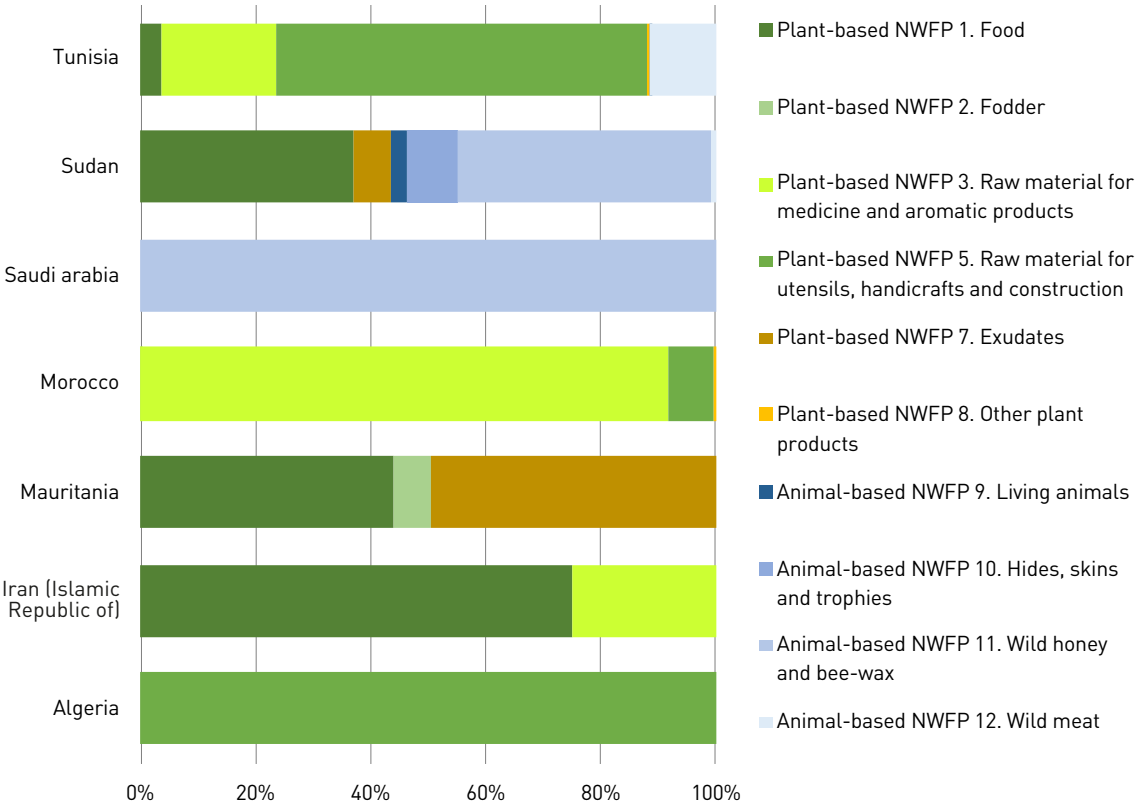


Table 61. Values of non-wood forest products reported to FRA 2020 by category and country

NWFP category Algeria		Value (USD million)							
		Algeria	Iran (Islamic Republic of)	Mauritania	Morocco	Saudi Arabia	Sudan	Tunisia	Total
Plant-based NWFP	1. Food	--	41 598.4	2 305.2	--	--	55 193.4	147.4	**99 244.3**
	2. Fodder	--	--	324.7	243.8	--	0.0	0.0	**568.5**
	3. Raw material for medicine and aromatic products	--	13 693.5	--	116 773.0	--	--	763.2	**131 229.7**
	5. Raw material for utensils, handicrafts and construction	1 925.1	--	--	10 459.9	--	--	2 462.3	**14 847.2**
	7. Exudates	--	--	2 597.4	--	--	9 885.4	--	**12 482.8**
	8. Other plant products	--	--	--	271.7	--		7.4	**279.1**
Animal-based NWFP	9. Living animals	--	--	--	--	--	4 118.9	8.4	**4 127.3**
	10. Hides, skins and trophies	--	--	--	--	--	13 180.5	--	**13 180.5**
	11. Wild honey and bee-wax	--	--	--	--	3 399.8	65 902.5	--	**69 302.3**
	12. Wild meat	--	--	--	--	--	1 647.6	442.2	**2 089.8**
Total		**1 925.1**	**55 291.9**	**5 227.3**	**127 748.3**	**3 399.8**	**149 928.2**	**3 830.9**	**347 351.5**

For details of reported NWFP values and species please refer to Annex 3.

There is a high degree of uncertainty associated with the quantification and pricing of NWFPs. The informal nature of NWFP removal and consumption, along with the multitude of products and units of measurement used, differences in reporting practices and lack of solid data for reporting from, make it necessary to proceed with caution when interpreting FRA 2020 NWFP data. As some NWFPs are harvested illegally (through poaching for example), official statistics are unlikely to capture all the products harvested. Not all countries reported on NWFPs to FRA 2020 and those that did reported only on up to the ten most important NWFPs. In addition, the conversion of all reported NFWP values to United States dollars can be influenced by fluctuations in exchange rates when comparing values over time. Country reports to FRA 2020 are purely quantitative and do not include information on the quality and different grades of NWFPs, the degree to which NWFPs are exported or their contribution to employment and poverty alleviation.

The common unit for quantifying the many different NWFPs reported to FRA 2020 is the United States dollar as a measure of economic value. NWFPs are also often associated with important social and cultural values, which cannot be expressed in monetary terms but which add to the importance of preserving NWFP supplies from healthy and productive forest ecosystems.

With FRA 2020, the state of knowledge on the quantities of NWFPs harvested is more comprehensive than ever before, but reporting can still be improved by, for example, further harmonizing the definitions of NWFPs and the units for reporting. This applies globally, not specifically to the NENA region.

With these limitations in mind, FRA 2020 provides an overview of the relative importance of specific NWFPs in the NENA countries that reported on them.
NWFPs are collected mainly in rural areas by forest-adjacent communities who are often relatively disadvantaged and poorer than urban dwellers. The FRA 2020 data show that edible NWFPs (food, honey and bushmeat) account for 49 percent of the reported total value of NWFPs in NENA. NWFPs therefore play an important role in poverty alleviation and food security. In times of food scarcity, NWFPs that are not normally harvested can act as a reserve source of food and fodder.

Algeria, the Islamic Republic of Iran, Mauritania, Morocco, Saudi Arabia, the Sudan and Tunisia reported to FRA 2020 on NWFPs. With the exception of Saudi Arabia these countries share some common traits: a relatively high forest area per capita and a high percentage of the population residing in rural areas. The Sudan, Yemen and Mauritania are low-income countries, and Algeria, Tunisia and Morocco are middle-income countries. Combined, the general trend is that where there is low GDP per capita, a high forest area per capita and a high proportion of the population living in rural areas, NWFPs are more likely to play a significant economic role. This emphasizes the potential for SFM and NWFPs to play even more significant roles in poverty alleviation, food security and reduced deforestation, locally but also as a source of revenue for the country, as illustrated in Box 6 on gum arabic production in the Sudan based on a 2017 report (UNCTAD, 2018).

Box 6. Gum arabic in the Sudan

Gum arabic is a dried sap obtained from the stems and branches of two acacia species: Acacia senegal and A. seyal. Almost all internationally traded crude gum arabic is produced in the so-called "gum belt" – the vast arid wooded savannahs that span sub-Saharan Africa from Mauritania and Senegal in the west, to the Sudan, Eritrea, Somalia, Kenya and the United Republic of Tanzania in the east. Crude gum arabic is also produced in smaller quantities in South Asia and the Arabian Peninsula (UNCTAD, 2018).
Gum arabic is often traded in its crude state, and significant value addition occurs through the various stages of processing. Gum arabic is an important NWFP as it has the ability to generate foreign exchange while promoting sustainable management of forests and woodlands and sustainable agriculture and agroforestry. Managing the forest for sustainable gum arabic production helps to combat desertification, mitigate climate change and improve food security.
According to the United Nations Conference on Trade and Development (UNCTAD), the Sudan is the world's largest exporter of crude gum arabic, accounting for 66 percent

of the global total (2014–2016). The market share of the Sudan has fluctuated over recent decades. In the late 1990s, the country's export of gum arabic was down to 45 000 tonnes/year, but in 2016 it reached a record high of 73 000 tonnes/year. The 2014–2016 estimated average annual export quantity was 67 090 tonnes/year, with an estimated export value USD 105 993 000. Both the Sudan and Mauritania reported gum arabic as the most important NWFP to FRA 2020.

Even with such impressive figures, the benefits for producing countries such as the Sudan and local communities could still be increased. The gum arabic sectors in producing countries are characterized by export orientation, a few large actors on the producer and buyer sides, low domestic value addition, gender segmentation and inequitable benefit sharing among stakeholders. Crude gum arabic is exported from producer countries, which the reimport processed gum arabic at high prices for the domestic manufacturing industry.

If a larger part of processing and value addition could be carried out in producer countries through sustainable inclusive value chains, an NWFP such as gum arabic has the potential to contribute even more to the national economy, improved rural livelihoods, poverty alleviation and the achievement of national development goals and the SDGs.

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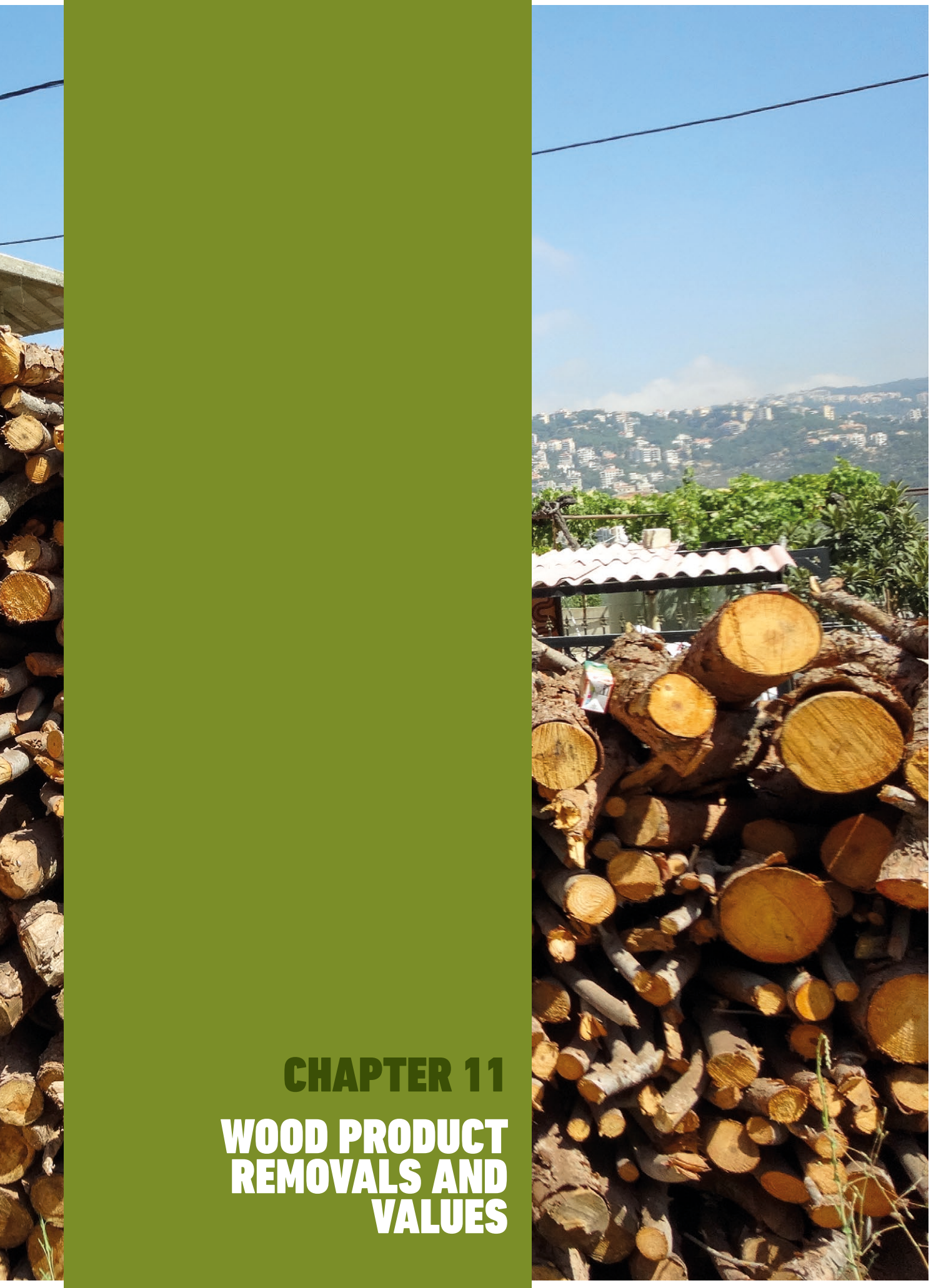


CHAPTER 11

WOOD PRODUCT REMOVALS AND VALUES

CHAPTER 11

Wood product removals and values

Data on wood removals is collected via the Joint Forest Sector Questionnaire[1] and made accessible via the Corporate Statistical database of FAO (FAOSTAT). To reduce the reporting burden on the countries, FRA 2020 does not include variables on wood product removals and value. The current chapter is therefore based on data from FAOSTAT.

11.1 Findings

Total removals of wood products

According to the FRA 2020 main report and FAOSTAT (FAO, 2020c), the global annual removal of wood in 2019 is approximately 4 billion m^3. The figure for annual removals in the NENA region is almost 60 million m^3 – equivalent to about 1.5 percent of the global total. Data for the Sudan is available in FAOSTAT only from 2012, and Palestine is not included in FAOSTAT statistics on wood product removals. The following discussion of trends in removals over the 29 years from 1990 to 2019 is therefore for the NENA region excluding the Sudan and Palestine; the remaining 18 countries account for 55.8 percent of the 2020 NENA forest area.

Between 1990 and 2019 the general trend is for increasing annual wood removals in the NENA region, growing by an average of 353 000 m^3/year, equivalent to an increase of 31 percent between 1990 and 2019, or 1 percent per year.

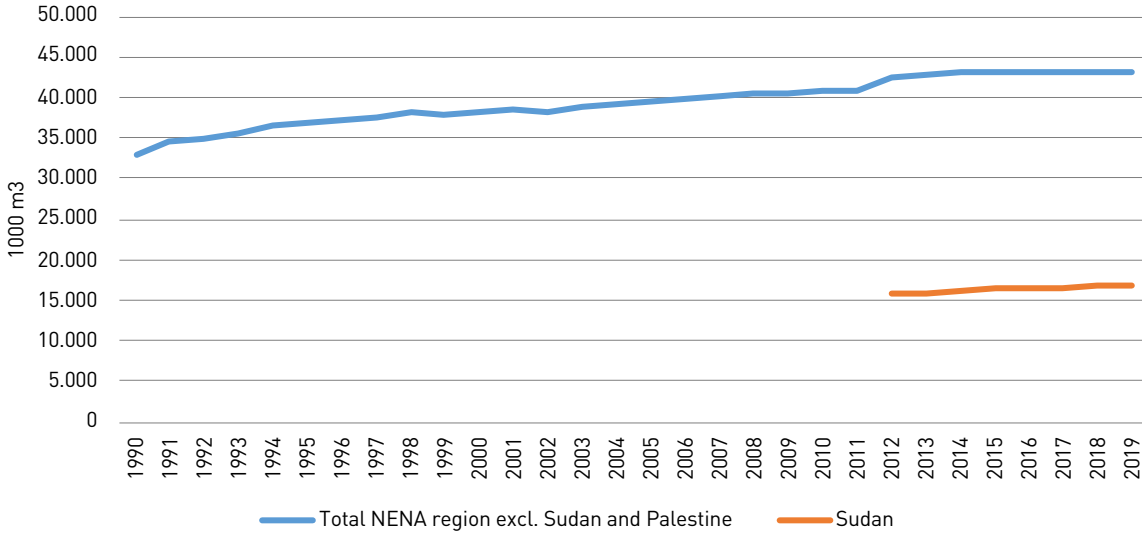
The trend in annual removals over the 29-year period is not linear. There is a tendency that the annual increase in removals to slow down:

- 1990–2000, annual average increase of 502 000 m^3/year;
- 2000–2010, annual average increase of 254 000 m^3/year;
- 2010–2019, annual average increase of 275 000 m^3/year.

Figure 44 illustrates the trend. The visible increment from 2011 to 2012 is mainly owing to increased FAOSTAT figures from Tunisia. The situation in the Sudan is illustrated separately, as data are available from FAOSTAT only since 2012. Between 2012 and 2019, the annual increase in removals of wood products was 246 000 m^3/year (including the Sudan).

[1] https://unece.org/forests/jfsq

Figure 44. Annual wood product removals in the NENA region, 1990–2020 ('000 m³)

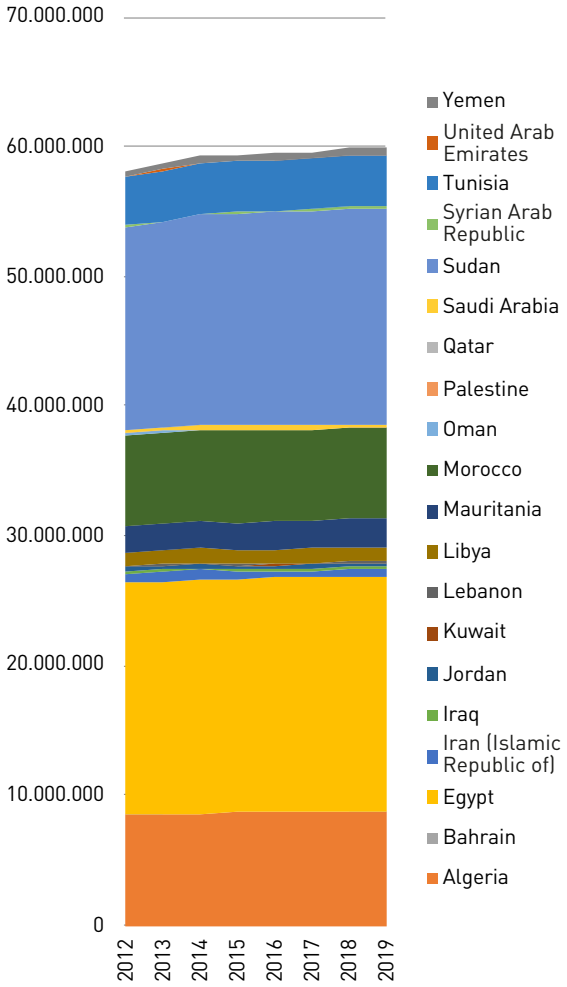


The slowing down of the yearly increment in removals of wood products is likely due to a combination of many factors, including increased availability of other energy sources, depletion of the most easily accessible woody resources, better utilization of wood and better access to alternatives to wood (for furniture making and construction, for example).

Figure 45 shows a breakdown of the data by country for the period 2012–2019. Egypt and the Sudan stand out as the major removers of wood in the NENA region. Egypt has the largest population in the region, which may explain its large share of wood removals. Contributing factors in the Sudan are likely to include household energy needs in rural areas, the large population and probably also the fact that the Sudan has a large forest area (resource availability). Algeria, Morocco and Tunisia also have large shares, probably owing to comparatively large forest areas and large demand for wood for construction and heating needs.

At the other end of the scale are the Gulf States, which account for very low shares of total removals.

Figure 45. Wood removals by country, 2012–2019



In 2019, the total population of the NENA region was 494 million people and the annual removals of wood products was 60 million m^3, giving an average wood consumption of 0.122 m^3/capita. In comparison, the global average in 2018 was 0.52 m^3/capita. Countries vary greatly with regards to the size of their populations, and Table 62 shows 2019 wood removals per capita.

Mauritania has the highest per capita removal in the NENA region at 0.49 m^3/capita/year in 2019, followed by the Sudan with 0.39 m^3/capita/year. The role of wood in meeting rural household energy needs is likely an important part of the explanation for this. A middle group of north African Mediterranean countries have removals at between 0.17 and 0.34 m^3/capita/year – heating and construction needs could be part of the explanation for this. Iraq, the Islamic Republic of Iran, the Gulf States, Lebanon and the Syrian Arab Republic have very low removals, typically of less than 0.01 m^3/capita/year.

Table 62. Wood removals and population by country, 2019

Country	Population 2019 ('000)	2019 removals (m^3)	Removals per capita (m^3/capita)	Country	Population 2019 ('000)	2019 removals (m^3)	Removals per capita (m^3/capita)
Algeria	43 053	8 824 897	0.205	Morocco	36 472	6 921 557	0.190
Bahrain	1 641	7 253	0.004	Oman	4 975	48 882	0.010
Egypt	100 388	18 098 162	0.180	Palestine	4 998	--	--
Iran (Islamic Republic of)	82 914	446 000	0.005	Qatar	2 832	5 116	0.002
Iraq	39 310	177 000	0.005	Saudi Arabia	34 269	301 220	0.009
Jordan	10 102	368 335	0.036	Sudan	42 813	16 683 000	0.390
Kuwait	4 207	20 447	0.005	Syrian Arab Republic	17 070	74 585	0.004
Lebanon	6 856	25 759	0.004	Tunisia	11 695	3 914 000	0.335
Libya	6 777	1 157 499	0.171	United Arab Emirates	9 771	18 847	0.002
Mauritania	4 526	2 200 712	0.486	Yemen	29 162	576 554	0.020
Total					**493 812**	**59 869 825**	**0.122**

-- = no data in FAOSTAT

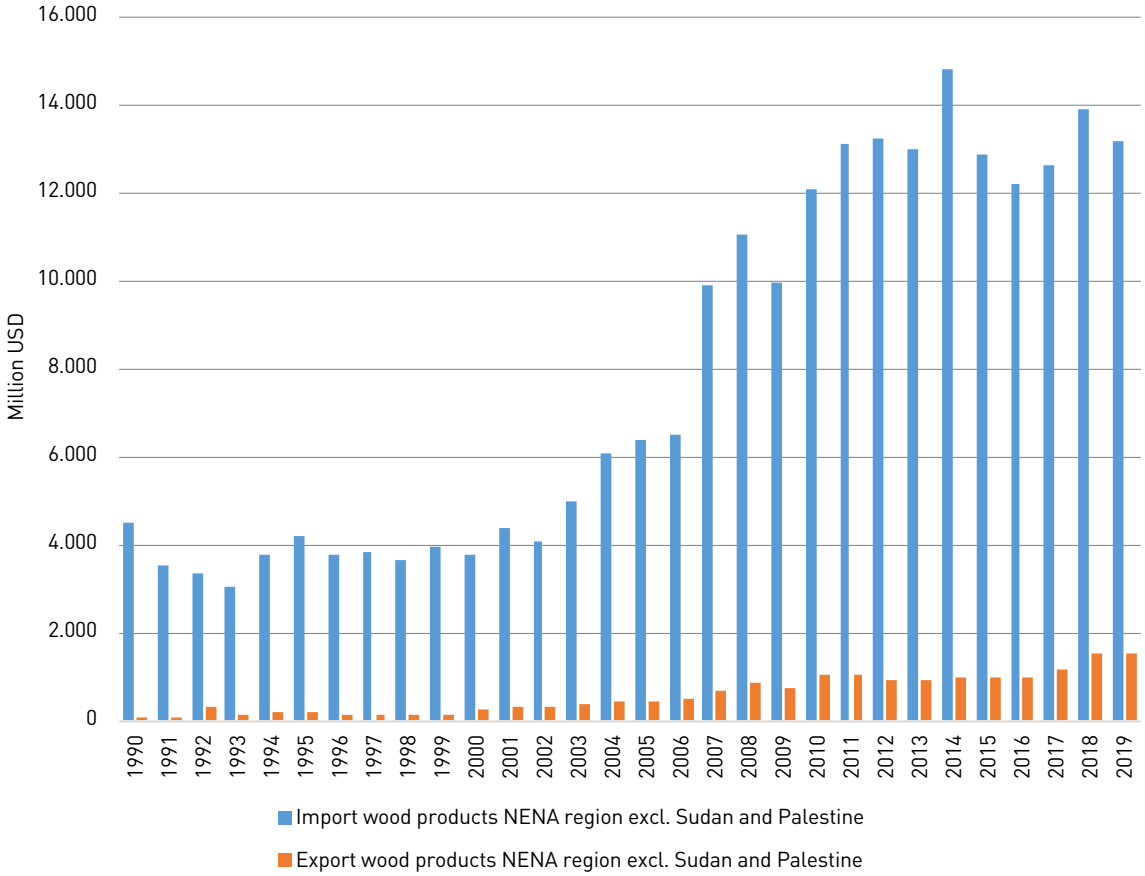
Imports and exports

Data from the Sudan are available in the FAOSTAT export and import statistics from 2012 and for Palestine from 2015. The initial part of the discussion of trends over the period 1990–2019 therefore does not include the Sudan and Palestine and covers the remaining 18 countries only, accounting for 55.8 percent of the 2020 NENA forest area.

The NENA region is a net importer of wood products. During the decade 1990–2000 imports were 29 times greater in value terms than exports were. In the decade 2000–2010 the equivalent ratio was 1:14, and in the most recent decade imports exceeded exports in value by a factor of 12 on average. There is a tendency for the value of imports to level off at about UD 13 billion/year. In 2019 imports were nine times greater in value than exports. The trends are illustrated in Figure 46.

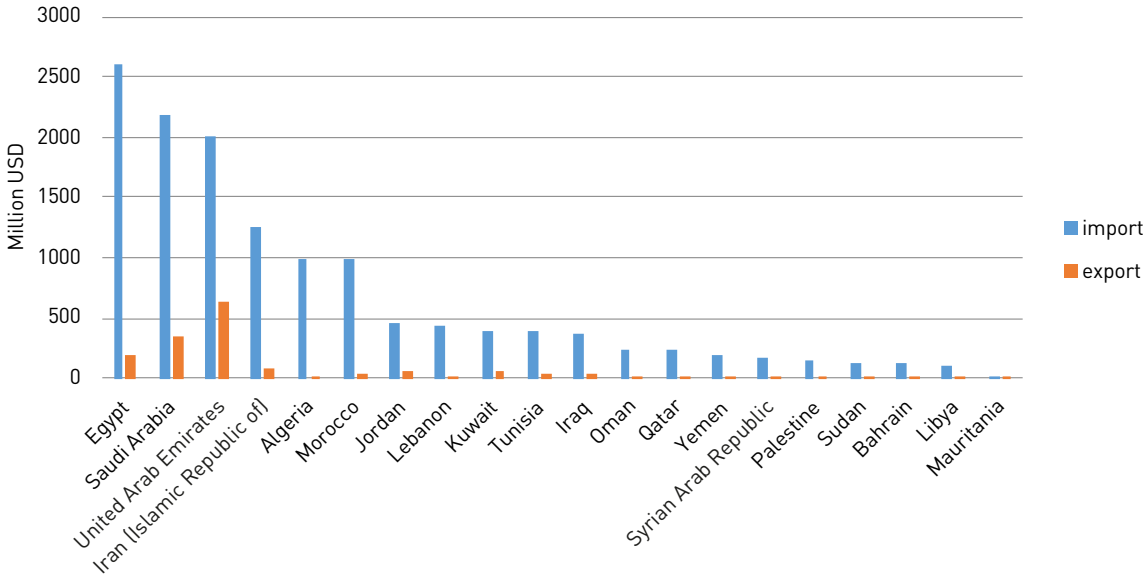
Although the development of exports increasing in value more quickly than imports is positive, the NENA region remains highly dependent on imports to meet the demand for wood products.

Figure 46. Imports and exports of wood products in the NENA region, 1990–2019



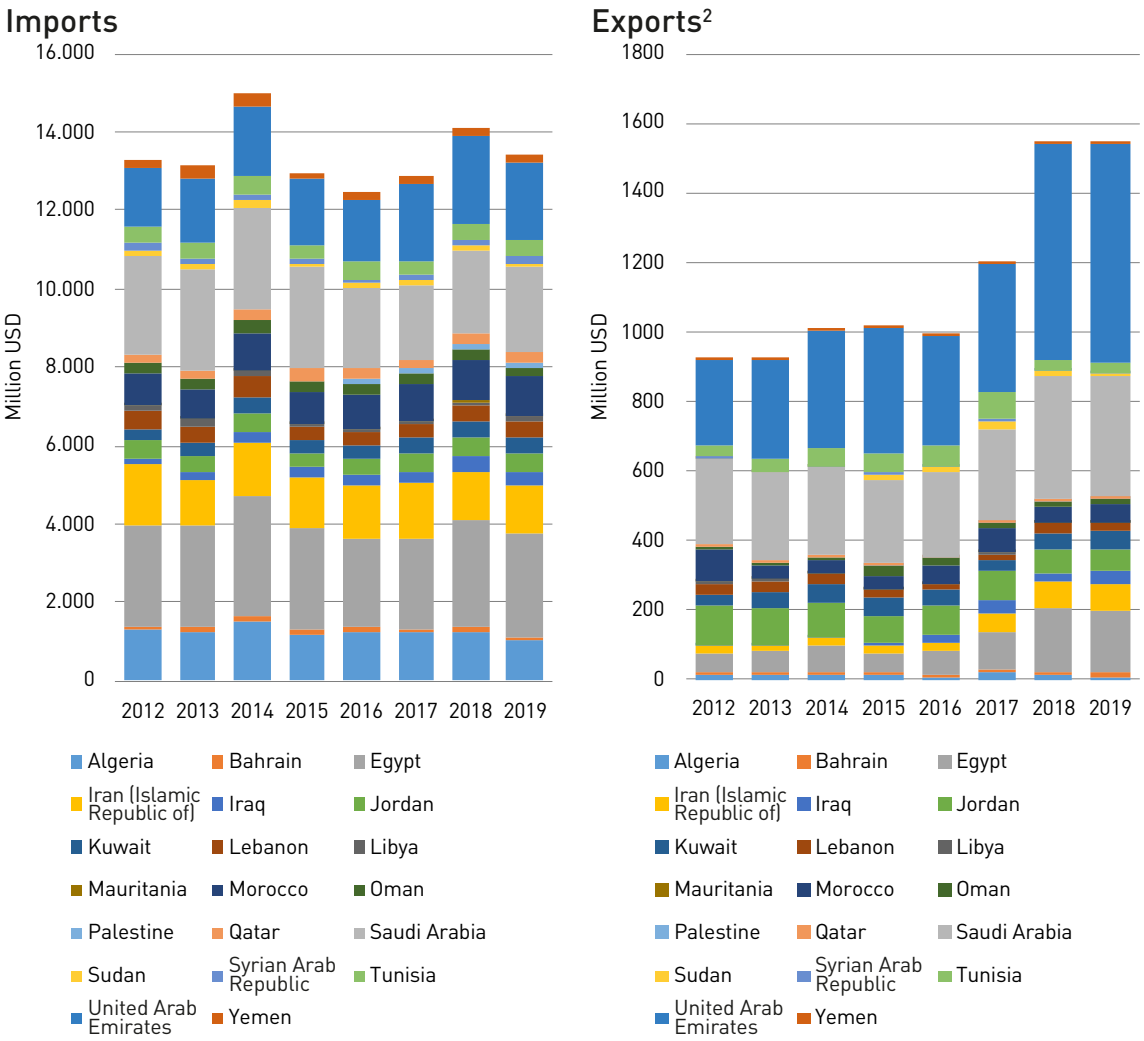
Looking specifically at 2019 (see Figure 47), Egypt, Saudi Arabia and the United Arab Emirates dominate imports. There is a tendency for countries with high imports also to have a high share of exports.

Figure 47. Wood product imports and exports by value by country, 2019



The United Arab Emirates and Saudi Arabia have the highest values of exports, likely an effect of international commodity trade. Egypt's comparatively low exports are likely the effect of large domestic demand from a large population and low forest cover.
As is the case for annual removals, data for the Sudan are available in FAOSTAT only from 2012. The country-level distribution of imports and exports is therefore considered only for the period 2012 –2019 as shown in Figure 48. Please note that figures for Palestine cover the period from 2015 only.

Figure 48. imports and exports of wood products by value in the NENA region, 2012–2019



Imports remain at about USD 13 billion/year between 2012 and 2019, with some fluctuation between years. Exports are increasing in value, particularly owing to the growth of exports from the United Arab Emirates, but also from Egypt, the Islamic Republic of Iran and Saudi Arabia.

[2] FAOSTAT figures for exports in 2018 and 2019 are identical. The trends described may be affected if the figures for 2019 are adjusted.

SUSTAINABLE DEVELOPMENT GOALS
1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS
SUSTAINABLE DEVELOPMENT GOALS

CHAPTER 12

CONTRIBUTION TO SUSTAINABLE DEVELOPMENT GOAL 15

CHAPTER 12

Contribution to Sustainable Development Goal 15

The 193 Member States of the United Nations adopted the 17 SDGs of the 2030 Agenda for Sustainable Development in September 2015. A global indicator framework was agreed in March 2017. Forests are important to several of the SDGs, particularly SDG 15 "life on land" (UN, 2020b).

FAO is the designated United Nations custodian agency for 21 SDG indicators. Three of these indicators are under SDG 15 and data for two of are collected and reported through the global FRA (Table 63).

Table 63. Sustainable Development Goal 15 – life on land

SDG 15 – life on land	Targets*	Indicators reported through FRA
	15.1. By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements.	15.1.1. Forest area as a proportion of total land area.
Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.	15.2. By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally.	15.2.1. Progress towards sustainable forest management Subindicators: 1. Forest area annual net change rate 2. Above ground biomass stock in forests 3. Proportion of forest area located within legally established protected areas 4. Proportion of forest area under long term forest management plans 5. Forest area under independently verified forest management verification schemes**

* The full set of targets and indicators for SDG 15 is available at www.un.org/sustainabledevelopment/biodiversity.

** Data provided by the main certification bodies – the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification Schemes (PEFC).

This chapter examines the degree to which the data needs for indicators and subindicators are met by the FRA 2020 datasets for NENA countries. Based on FRA 2020 data, the chapter provides an indication of whether developments are on track towards achievement of the defined targets for the indicators and subindicators through a simple traffic light indication scheme at country level.

12.1 SDG Target 15.1.1 – Forest area as proportion of total land area

Indicator 15.1.1 is derived by dividing the forest area reported to FRA 2020 by the total FAOSTAT land area of the reporting country. This provides an indicator of forest cover and forest cover change that is intuitively easy to understand. Forest area data are typically based on land-use and land cover maps and/or NFIs, which are implemented at various frequencies. Several years (even decades) may pass between updates of primary data sources on the size and condition of national forest resources, such as an NFI or new maps. The area data in FRA is updated yearly, based on actual new data or extrapolations.

Table 64 shows the values of the SDG indicator 15.1.1 for the years 2000, 2010 and 2015 onwards for individual countries and the NENA region as a whole. The reference year is 2015. For the years 2010 and 2015–2020 a colour code is assigned based on whether the percentage of forest area has increased, remained stable or decreased compared with the previous reporting year.

Table 64. SDG indicator 15.1.1 – forest area as a percentage of total land area at the country and regional levels (baseline 2015)

Country	Percentage							
	2000	2010	2015	2016	2017	2018	2019	2020
Algeria	0.66	0.81	0.82	0.82	0.82	0.81	0.81	0.82
Bahrain	0.48	0.68	0.78	0.81	0.83	0.86	0.88	0.91
Egypt	0.06	0.07	0.05	0.05	0.05	0.05	0.05	0.05
Iran (Islamic Republic of)	5.73	6.56	6.56	6.57	6.58	6.59	6.6	6.6
Iraq	1.88	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Jordan	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Kuwait	0.27	0.35	0.35	0.35	0.35	0.35	0.35	0.35
Lebanon	13.51	13.43	13.72	13.78	13.83	13.89	13.95	14.01
Libya	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Mauritania	0.41	0.36	0.33	0.32	0.32	0.31	0.31	0.3
Morocco	12.34	12.71	12.74	12.77	12.8	12.82	12.84	12.87
Oman	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Palestine	1.51	1.65	1.68	1.68	1.68	1.68	1.68	1.68
Qatar	0	0	0	0	0	0	0	0
Saudi Arabia	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
Sudan	11.69	10.76	10.29	10.2	10.11	10.02	9.93	9.84
Syrian Arab Republic	2.35	2.68	2.84	2.84	2.84	2.84	2.84	2.84
Tunisia	4.3	4.42	4.47	4.48	4.49	4.5	4.51	4.52
United Arab Emirates	4.36	4.47	4.47	4.47	4.47	4.47	4.47	4.47
Yemen	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
NENA Total forest area ('000 ha)	**42 942**	**43 118**	**42 291**	**42 148**	**41 980**	**41 817.5**	**41 678**	**41 531**
NENA total land area ('000 ha)	**1 407 567**	**1 407 567**	**1 407 567**	**1 407 567**	**1 407 567**	**1 407 567**	**1 407 567**	**1 407 567**
NENA forest as proportion of total land area (%)	**3.05**	**3.06**	**3.00**	**2.99**	**2.98**	**2.97**	**2.96**	**2.95**

Green indicates increasing proportion of forest compared with previous reporting year, orange indicates stable proportion and red indicates decreasing proportion. No colour = not possible to evaluate.

Regional trends: For the NENA region as a whole, the proportion of forest is decreasing in all years from 2016 to 2020. Between 2000 and 2020, the forest area declined from 3.05 percent of the total land area to 2.95 percent:

- The decline in forest area at the regional level is driven mainly by area changes in the Sudan and Mauritania, which report decreasing proportions of forest cover during the period 2016–2020.
- Six countries, report stable forest areas during the period 2010–2020. A possible explanation of stable figures is that figures from previous years are being resubmitted in the absence of updated information.
- Five countries (Bahrain, the Islamic Republic of Iran, Lebanon, Morocco and Tunisia) report increasing proportions of forest area from 2015 to 2020. With exception of Bahrain, these countries have relatively strong traditions in forest inventory, relatively large forest areas and national reforestation efforts. In Lebanon and Morocco, the increases are likely the visible result of the national afforestation programmes mentioned in Boxes 1 and 4.

12.2 SDG Target 15.2.1 – Progress towards sustainable forest management

SDG indicator 15.2.1. has five subindicators:

1. forest area annual net change rate;
2. above-ground biomass stock in forests;
3. proportion of forest area located within legally established protected areas;
4. proportion of forest area under long-term forest management plan;
5. forest area under independently verified forest management verification schemes.

The following paragraphs describe how SDG Target 15.2.1 is achieved at the country level based on FRA 2020 data on the five subindicators. Evaluation of progress towards SDG Target 15.2.1 at the regional level has not been attempted owing to missing values at the country level.

SDG 15.2.1 subindicator 1 – forest area annual net change rate

Table 65 shows the values for the SDG subindicator "forest area annual net change" under SDG indicator 15.2.1 "progress towards sustainable forest management". For the seven time intervals in the table, a colour code is used to indicate whether the forest net annual change rate is negative (forest area decreases), zero (forest area remains stable) or positive (forest area increases).

Table 65. SDG indicator 15.2.1 subindicator 1 – forest area annual net change rate

Country	Percentage						
	2000–2010	2010–2015	2015–2016	2016–2017	2017–2018	2018–2019	2019–2020
Algeria	1.96	0.39	0	-0.67	-0.67	0.46	0.51
Bahrain	3.46	2.9	3.23	3.13	3.03	2.94	2.86
Egypt	1.04	-5.9	-7.65	0	0	0	0
Iran (Islamic Republic of)	1.38	0	0.09	0.08	0.15	0.15	0.08
Iraq	0.09	0	0	0	0	0	0
Jordan	0	0	0	0	0	0	0
Kuwait	2.57	0	0	0	0	0	0
Lebanon	-0.06	0.43	0.43	0.42	0.42	0.42	0.42
Libya	0	0	0	0	0	0	0
Mauritania	-1.37	-1.53	-1.63	-1.64	-1.7	-1.7	-1.76
Morocco	0.3	0.04	0.26	0.21	0.17	0.18	0.18
Oman	0	0	-7.14	-3.7	-3.85	-4	0
Palestine	0.92	0.38	0	0	0	0	0
Qatar	0	0	0	0	0	0	0
Saudi Arabia	0	0	0	0	0	0	0
Sudan	-0.83	-0.88	-0.85	-0.91	-0.92	-0.93	-0.94
Syrian Arab Republic	1.31	1.19	0	0	0	0	0
Tunisia	0.29	0.22	0.22	0.22	0.22	0.22	0.22
United Arab Emirates	0.25	0	0	0	0	0	0
Yemen	0	0	0	0	0	0	0

Green indicates increasing forest area, orange indicates stable area, and red indicates decreasing area.

Reporting on subindicator 1 reflects the reduction in forest area in the region discussed in Section 2.1 (a 6 percent reduction over the 30 years from 1990 to 2010). The conclusion in Section 2.1 was that for the NENA region as a whole, forest continues to be lost throughout the 30-year period at a slightly increasing rate, rising from 0.40 percent per year in 1990–2000 to 0.56 percent per year between 2015 and 2020. The increases in forest area reported by several countries are offset by forest losses, especially in the Sahel countries, resulting in a net forest loss for the region over the three reporting decades.

SDG 15.2.1 subindicator 2 – above-ground biomass stock in forest

Table 66 shows the values for the SDG subindicator "above-ground biomass stock in forest" under SDG indicator 15.2.1 "progress towards sustainable forest management". For the years 2010 and 2015–2020, a traffic-light colour code is used to indicate whether the average above-ground biomass per hectare is decreasing, stable or increasing compared with the previous reporting year.

Table 66. SDG indicator 15.2.1 subindicator 2 – above-ground forest biomass

Country	(tonnes/ha)							
	2000	2010	2015	2016	2017	2018	2019	2020
Algeria	29.16	29.38	29.51	29.41	29.38	29.18	29.37	29.39
Bahrain	--	--	--	--	--	--	--	--
Egypt	120	120	120	120	120	120	120	120
Iran (Islamic Republic of)	137.17	138.44	138.44	138.31	138.2	137.99	137.78	137.67
Iraq	52.88	52.69	52.46	52.21	51.96	51.69	51.41	51.11
Jordan	56.9	56.9	56.9	56.9	56.9	56.9	56.9	56.9
Kuwait	--	--	--	--	--	--	--	--
Lebanon	61.16	61.27	61.26	61.27	61.27	61.27	61.27	61.27
Libya	49.26	49.26	49.26	49.26	49.26	49.26	49.26	49.26
Mauritania	39.92	41.35	42.25	52.51	52.65	52.8	52.95	53.11
Morocco	37.07	39.23	39.63	39.65	39.72	39.77	39.83	39.89
Oman	104.14	104.14	104.14	105.4	106.1	106.85	107.67	107.67
Palestine	--	--	--	--	--	--	--	--
Qatar	--	--	--	--	--	--	--	--
Saudi Arabia	26.61	26.61	26.61	26.61	26.61	26.61	26.61	26.61
Sudan	55.98	55.98	55.98	55.98	55.98	55.98	55.98	55.98
Syrian Arab Republic	49.99	49.99	50.04	50.04	50.03	50.01	50	49.98
Tunisia	53.39	62.73	48.89	62.55	60.09	59.06	58.93	58.74
United Arab Emirates	74.35	74.31	74.43	74.43	74.43	74.43	74.43	74.43
Yemen	13.99	13.99	13.99	13.99	13.99	13.99	13.99	13.99

Green indicates increasing above-ground biomass, orange indicates no change, and red indicates decreasing above-ground biomass.

Grey = missing values.

No colour = not possible to evaluate.

SDG 15.2.1 subindicator 3 – proportion of forest within legally established protected areas

Table 67 displays the values for the SDG subindicator "proportion of forest within legally established protected areas" under SDG indicator 15.2.1 "progress towards sustainable forest management". For the years 2000, 2010 and 2015–2020, a traffic light colour code system is used indicate whether the proportion of forest within legally established protected areas (with the 2015 forest area as the baseline) is decreasing, stable or increasing compared with the previous reporting year.

Table 67. SDG indicator 15.2.1 subindicator 3 – proportion of forest within legally established protected areas (2015 baseline)

Country	Percentage							
	2000	2010	2015	2016	2017	2018	2019	2020
Algeria	6.08	6.08	6.08	6.08	6.08	6.08	6.08	6.08
Bahrain	--	--	--	--	--	--	--	--
Egypt	--	--	--	--	--	--	--	--
Iran (Islamic Republic of)	--	10	10	14.12	14.12	14.12	14.12	14.12
Iraq	--	--	--	--	--	--	--	--
Jordan	--	--	--	--	--	--	--	--
Kuwait	--	--	--	--	--	--	--	--
Lebanon	--	--	--	--	0.6	--	--	--
Libya	--	--	--	--	--	--	--	--
Mauritania	14.12	14.12	14.12	14.12	14.7	14.7	14.7	14.7
Morocco	0.83	4.59	4.59	4.59	4.59	4.59	4.59	4.58
Oman	--	--	--	--	--	--	--	--
Palestine	--	--	--	--	--	--	--	--
Qatar	--	--	--	--	--	--	--	--
Saudi Arabia	--	0.31	0.31	0.31	0.31	0.31	0.31	0.31
Sudan	16.94	24.51	24.51	24.51	24.51	24.51	24.51	24.51
Syrian Arab Republic	--	--	--	--	--	--	--	--
Tunisia	3.28	10.67	10.84	10.84	10.84	10.84	10.84	10.84
United Arab Emirates	--	--	--	--	--	--	--	--
Yemen	--	5.65	5.65	5.65	5.65	5.65	5.65	5.65

Green indicates increasing proportion of forest within legally established areas compared with previous year, orange indicates stable proportion, and red indicates decreasing proportion.

Grey = missing values.

No colour = not possible to evaluate.

SDG 15.2.1 subindicator 4: proportion of forest under long-term forest management plan

Table 68 shows the values for the SDG subindicator "proportion of forest under long-term forest management plan" under SDG indicator 15.2.1 "progress towards sustainable forest management". For the years 2000, 2010 and 2015–2020, a traffic light colour code system is used to indicate whether the proportion of forest with long-term forest management plans (with the 2015 forest area as the baseline) is decreasing compared with the previous reporting year, stable or increasing.

Table 68. SDG indicator 15.2.1 subindicator 4 – proportion of forest under long-term forest management plan (2015 baseline)

Country	Percentage							
	2000	2010	2015	2016	2017	2018	2019	2020
Algeria	--	7.77	7.77	10.07	11.86	13.5	13.5	13.5
Bahrain	--	--	--	--	--	--	--	--
Egypt	--	--	--	--	--	--	--	--
Iran (Islamic Republic of)	9.19	28.81	28.99	28.99	28.99	28.99	28.99	28.99
Iraq	0	0	0	0	0	0	0	0
Jordan	--	--	--	--	--	--	--	--
Kuwait	--	--	--	--	--	--	--	--
Lebanon	--	--	--	--	--	--	--	--
Libya	--	--	--	--	--	--	--	--
Mauritania	0	1.87	0	0	0	0	0.12	0.15
Morocco	24.44	43.02	52.4	54.53	56.35	58.05	59.81	61.57
Oman	--	--	--	--	--	--	--	--
Palestine	--	--	--	--	--	--	--	--
Qatar	--	--	--	--	--	--	--	--
Saudi Arabia	--	--	--	--	--	--	--	--
Sudan	17.48	25.58	25.77	25.77	25.77	25.77	25.77	25.77
Syrian Arab Republic	--	--	--	--	--	--	--	--
Tunisia	69.95	69.95	69.95	69.95	69.95	69.95	69.95	69.95
United Arab Emirates	--	--	--	--	--	--	--	--
Yemen	--	--	--	--	--	--	--	--

Green indicates increasing proportion of forest with long-term forest management plan compared with previous year, orange indicates stable proportion, and red indicates decreasing proportion.

Grey = missing values. No colour = not possible to evaluate.

The proportion of forest under forest management plans in all reporting countries has been stable or increasing since 2016, meaning that long-term management plans for forest areas are becoming more common, which is a positive development.

Section 5.4 discussed how reporting countries, accounting for 93.05 percent of the NENA region forest area in 2020, reported 12.3 million ha of forest area under long-term forest

management plans in 2020. This corresponds to 31.8 percent of the total forest area of the reporting countries.

SDG 15.2.1 subindicator 5 – forest area under independently verified forest management certification schemes

Morocco is the only country in the NENA region that is reported by the PEFC and FSC secretariates as having engaged in independent forest management verification schemes during the reporting period 1990–2020. Morocco reported 20 270 ha of certified forest in 2010. The data represent only one point in time for one reporting country and it is therefore not possible to define a trend based on them. The forestry sector in most NENA countries is small, with limited high-value commercial production, which is part of the reason why voluntary, market-driven certification schemes are not common in the region.

CHAPTER 13

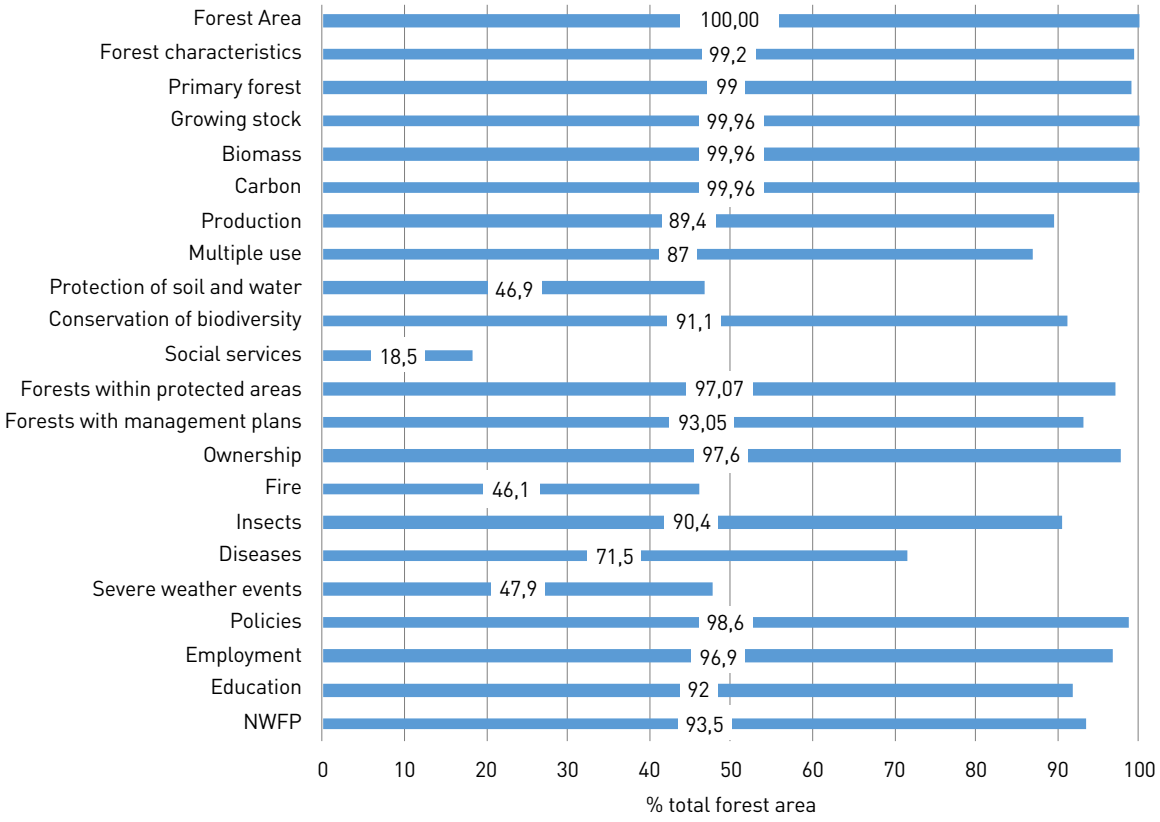
Discussion

The reliability of any assessment is directly related to the quantity and quality of the data inputs, including their timeliness. The current chapter sums up and discusses trends in the quantity and quality of the FRA 2020 datasets for the NENA region and sets the stage for a qualified informed discussion on the use of FRA 2020 data as an evidence base for decision-making and on the level of ambition concerning the quality of the information.

13.1 Quantity of data inputs

Thirteen out of twenty countries, accounting for 96.4 percent of the region's forest area, submitted FRA 2020 reports on forest resources. The remaining seven countries, accounting for 3.6 percent of the forest area, were covered by FRA desk studies conducted by FAO. Figure 49 summarizes the quantity of the datasets for NENA region for the 22 main variables encompassed by national FRA 2020 reporting.

Figure 49. Data availability for reporting on status and trends, 22 main variables



Although Figure 49 indicates a high degree of completeness in the reporting, it should be noted that the Sudan, the Islamic Republic of Iran and Morocco account for 84 percent of the forest area of the region and reported on most of the parameters.
The variables that seem to have less complete reporting to FRA 2020 are those related to primary forest management objectives (protection of soil and water and social services) and to disturbance affecting forest areas (fire, severe weather events and, to a lesser extent, disease). This may be a reflection of the current stage of forest knowledge and forest/land-use planning in NENA and could provide the inspiration for identifying areas were extra focus is needed – such as designation of primary forest management objectives and monitoring of damage. The NENA region is a biodiversity hotspot, which makes it important to identify and protect any remaining areas of primary forest or other forest areas of high biodiversity with a view to conserving them as ecosystems for the future.

13.2 Quality of data inputs

While the previous section reported on the extents of forest area for which there is reporting on 22 main variables, this section examines the quality of the data submitted. The FAO tier levels summarized in Table 69 are used to grade the datasets from NENA countries.

Table 69. FAO tier levels for assessment of data quality

Class	Variable	Status	Trend
Tier 3	Forest area	Data from 2013 or more recent from a good data source (NFIs, sample-based remote sensing (RS), wall-to-wall mapping).	Multiple consistent data points (in terms of methods and classes), all from 2013 or more recent or Tier 3 Status, incl. recent forest area change estimates (i.e. from a REDD+ FREL).
	Growing stock	Data from NFIs from 2009 or more recent (incl. RS-based method calibrated by inventory plot data).	Data from multiple consistent NFIs, all from 2009 or more recent.
	Biomass	Data derived from country-specific or targeted expansion factors, allometric models, etc.	
	Carbon	Data provided for all five carbon pools (AGB, BGB, litter, deadwood and soil).	
Tier 2	Forest area	Data older than 2013 and good data source (NFIs, sample-based RS, wall-to-wall mapping).	Multiple data points but limited consistency (in terms of methods and classes), and/or older than 2013, incl. 1 data point and expanded trends from the external datasource.
	Growing stock	Data from NFIs older than 2009.	Data from multiple NFIs or RS-based estimates but limited consistency, and/or older than 2009, incl. cases with one NFI and using detailed multi-date, RS assessment of different forest types.
	Carbon	Data provided for at least two carbon pools.	
Tier 1	Forest area	Other (incl. data from registers or questionnaires, expert assessments).	Other.
	Growing stock	Other.	Other.
	Biomass	Data derived from default factors or generic equations, i.e. all countries using the biomass calculator.	
	Carbon	Other.	

The age of datasets is one of the parameters in the tier classification.
When applying the tier criteria for data reliability to the datasets of NENA countries, the distribution is as shown in Table 70 and Figure 50.

Table 70. Numbers of countries by data reliability tiers for six indicators

Class	Variable	Status (2020 data)	Trend (change/year)
Tier 3	Forest area	*4 countries – 41% of forest area*: Islamic Republic of Iran, Lebanon, Mauritania, Morocco.	*2 countries – 16% of forest area*: Morocco, Tunisia.
	Growing stock	--	
	Biomass	*1 country – 14% of forest area*: Morocco.	
	Carbon	*2 countries – 15% of forest area*: Morocco, Yemen.	
Tier 2	Forest area	*5 countries – 54% of forest area*: Algeria, Saudi Arabia, the Sudan, Tunisia, Yemen.	*6 countries – 78% of total forest area*: Algeria, Islamic Republic of Iran, Lebanon, Mauritania, Saudi Arabia, the Sudan.
	Growing stock	*8 countries – 51% of forest area*: Algeria, Islamic Republic of Iran, Lebanon, Mauritania, Morocco, Saudi Arabia, Tunisia, Yemen.	*5 countries – 47% of total forest area*: Algeria, Islamic Republic of Iran, Mauritania, Morocco, Tunisia.
	Carbon	*13 countries – 85% of forest area*: Algeria, Islamic Republic of Iran, Lebanon, Tunisia, Iraq, Jordan, Libya, Mauritania, Oman, Saudi Arabia, the Sudan, Syrian Arab Republic, United Arab Emirates.	
Tier 1	Forest area	*11 countries – 5% of forest area*: Bahrain, Egypt, Iraq, Jordan, Kuwait, Libya, Oman, Palestine, Qatar, Syrian Arab Republic, United Arab Emirates.	*12 countries – 6% of forest area*: Bahrain, Egypt, Iraq, Jordan, Kuwait, Libya, Oman, Palestine, Qatar, Syrian Arab Republic, United Arab Emirates, Yemen.
	Growing stock	*8 countries – 49% of forest area*: Egypt, Iraq, Jordan, Libya, Oman, the Sudan, Syrian Arab Republic, United Arab Emirates.	*10 countries – 53% of forest area*: Egypt, Iraq, Jordan, Libya, Oman, Saudi Arabia, the Sudan, Syrian Arab Republic, United Arab Emirates, Yemen.
	Biomass	*14 countries – 84% of forest area*: Algeria, Egypt, Iraq, Islamic Republic of Iran, Jordan, Lebanon, Libya, Mauritania, Oman, Saudi Arabia, the Sudan, Syrian Arab Republic, United Arab Emirates, Yemen.	
	Carbon	--	

With the exception of carbon, the overall trend is that many countries are at the lowest level of data reliability (tier 1) and few are at the highest level (tier 3), with tier 2 assuming a middle position in terms of number of countries.
Regarding carbon, the FRA 2020 datasets generate carbon estimates for minimum above- and below-ground biomass carbon pools for all countries, meaning that all NENA countries by definition fulfil the criteria for tier 2 with regards to carbon (see Table 70) even though the carbon calculations may be based on tier 1 estimates of growing stock.

Figure 50. FAO tier levels and number of countries in the NENA region

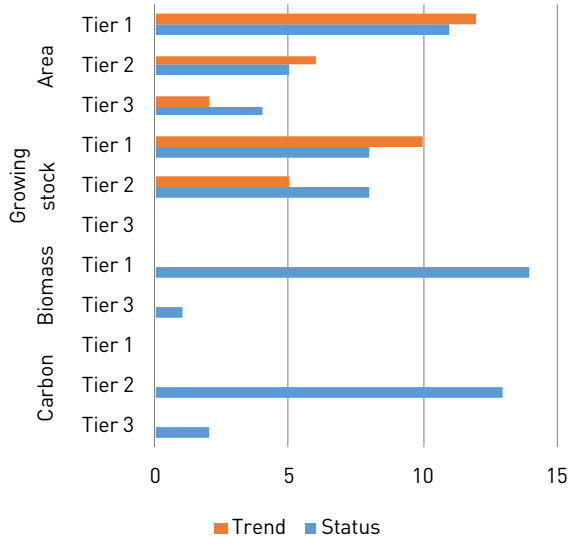
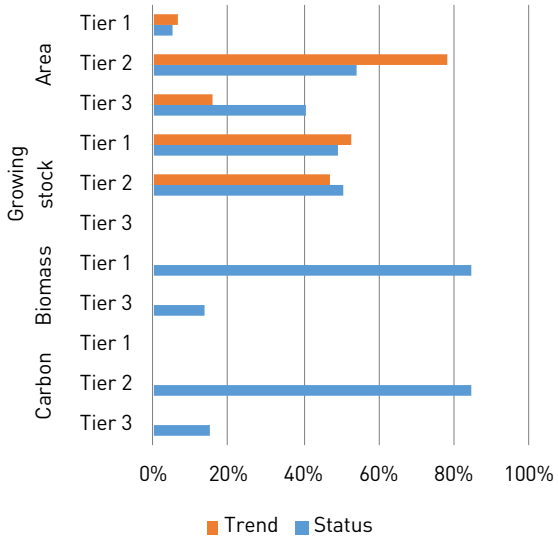


Figure 51. FAO tier levels and percentage of forest area in the NENA region



NENA is a region of mostly dry climates that do not support high production levels of wood and where the contribution of the formal forest subsector to national economies is small. This explains why the forestry sector is not well established in the most arid countries of the region and why separate administrative structures devoted to forestry at the national level, and the capacity to support high-quality reporting on forest resources are not always present.

AIthough more than half the countries in the region are in the lowest tier for area status and change indicators, together these countries represent only 5–6 percent of the NENA forest area. The picture is therefore very different when looking at forest areas under the different tier levels for the same six indicators (Figure 51).

The area data indicators (of status and trend) show the highest reliability among the six indicators, with significant proportions of forest area in tier 3 for these indicators (41 percent for status, and 16 percent for trend). Most of the forest area is in tier 2 (54 percent for status, and 78 percent for trend), and only 5 percent for status and 6 percent for trend is in tier 1.

The reason for the relative strength of area data is that most countries have conducted land-use or land cover mapping or remote sensing surveys with full country coverage (thereby qualifying for tier 2). Where the maps are more recent than 2013, they qualify for tier 3 (for status). However, on average the reference year of the area data is 2009.

Two countries – Morocco and Tunisia – qualify for tier 3 for forest area trends owing to having multiple sets of consistent data.

The indicators for growing stock (status and trends) show a lower level of reliability than the indicators for forest area. Where the source of data is an NFI or sample-based remote sensing estimates calibrated with data from prior to 2009, the growing stock indicators qualify for

tier 2. As NFI data for the NENA countries is from prior to 2009, no countries currently qualify for tier 3. The ongoing NFIs supported by FAO in Lebanon, the Sudan and Tunisia will improve the reliability of data on growing stock status and trends in the region.

For biomass data, only Morocco fulfils tier 3 requirements (owing to country-specific expansion factors for deriving biomass estimates) while the rest of the NENA region relies on IPCC default values, thereby classifying as tier 1.

While most NENA countries qualify for carbon tier 2, two (Morocco and Yemen) reported on all five carbon pools and thereby qualify for tier 3.

13.3 Other quality considerations

FRA 2020 presents the present state of knowledge on global forest resources country by country and variable by variable. It is valuable for describing global, regional and national trends in the development of forest resources, based on the best available knowledge. As well as presenting the current state of knowledge on forest resources and their management and use, FRA 2020 is also useful in exposing knowledge gaps and areas in need of enhancement.

In other words, FRA 2020 reports on what is known about the forests, but also what is not known. The following are some observations (not in any order of priority) from an analysis of the NENA data for informing the future enhancement of data collection and use.

Use of expert estimates for growing stock and projections: For growing stock data at tier level 1 there is a tendency to use and repeat rounded estimates, which range widely – for example, estimates of growing stock from planted forests range from 20 m^3/ha to 120 m^3/ha, and have remained unchanged for 30 years according to reports from nine countries. A critical review of the use of rounded estimates and their possible adjustment is a potential focus area.

Frequent missing values: Data on the variable "forest area" are complete, but the remaining 20 variables all lack some values. For analytical purposes, there is a great difference between a zero value and a missing value. Where a missing value occurs, the only option is to omit it from the analysis:

- Missing values can lead to reduced values being reported, as mentioned in the subsection on "Forest growing stock" in Section 4.1 where missing values for growing stock on 1.2 million ha of planted forests leads to underestimates of growing stock, biomass and carbon stock for the region and for the countries concerned.
- Missing values can also make it impossible to describe regional trends because only a limited number of countries have provided data. This is true for a number of variables in Chapters 5, 6 and 7, where the regional trends are weak or cannot be defined because of the low numbers of countries reporting on the variables.

It is therefore recommended that capacity building on FRA 2020 reporting be carried out, along with efforts to reduce the number of missing values.

Weak data on primary forests: While biodiversity conservation is reported as the primary management objective for 20 percent of the NENA forest area, only three countries report the existence of primary forest. Primary forests are of high importance from a biodiversity perspective and are scarce in the region owing to human impacts. A more comprehensive statistic that captures patches and remnants of primary forest in less accessible areas across the NENA region would provide useful information for land-use planning with a view to conserving these remnants for future generations, and could be a valuable area for strengthening.

Weak data on other land with tree cover (OLWTC): Generating more knowledge on the wood available from OLWTC is important because it is an accessible and more harvestable wood resource. Agroforestry can be a valuable source of wood, food and fodder. The datasets that were sufficiently complete to allow comparisons over time indicate that OLWTC is expanding in the region and can often contain more biomass than surrounding OWL or forest areas do. FRA 2020 data on OLWTC are based on ten submissions, of which only two are complete. Enhancement of reporting on OLWTC could strengthen the overall picture of woody resources.

Methodological changes: Changes in the methodology used and the accessibility of data for reporting can cause trends in the data for the NENA region to shift vertically, as seen with the data on total forest area and naturally regenerating forest. This possibility needs to be taken into consideration when describing trends over time in order to ensure that the changes described are real.

Effects of aggregation of data on the assessment of country developments: The NENA countries show very different trends with respect to the development of forest resources. A positive development in one country may be overshadowed by a negative development in another country. In order not to miss the many positive developments at the national level, the primary focus should remain on the country level. The figures for forest area and growing stock are dominated by a few countries, and there are many missing values in the reported data. Regional level estimates should therefore be interpreted with great caution.

Review of the criteria used in the tier system for assessing the quality of information on carbon: All the countries in NENA fulfil the criteria for tier 2 with regards to carbon because FRA 2020 generates estimates for above- and below-ground biomass. However, these estimates may be based on tier 1 data on growing stock and areas. Similarly , a country that for which estimates on all five carbon pools are reported is automatically in tier 3, even though the underlying information on area and growing stock may be tier 1. A revision of the tier criteria for reporting on carbon might be appropriate in order better to reflect the quality of the data.

Non reporting on carbon pools: The largely missing datasets on the carbon stocks of dead wood, litter and soil carbon could indicate areas in need of enhancement, either through more complete FRA country reporting or by introducing a standardized way of handling missing data on carbon stocks using default values. The default values that are reported for soil carbon stock per hectare are typically larger than the carbon stock from the living biomass, leading to high carbon estimates for the countries that report on soil carbon. As all countries have figures for living biomass (above- and below-ground), this is currently the best variable for comparing their carbon pools.

Different interpretations of variables for FRA 2020 reporting: For some variables, national reports interpret the same variable differently:

- For example, in reporting employment in the forestry sector, some countries include informal employment and others do not, causing the figures to be incomparable.
- Another example is reporting on national definitions of forest degradation and the ways in which it is monitored. There seems not to have been full clarity on how to respond on this variable as some countries reported on the measures needed in order to revert degradation rather than on how forest degradation is monitored.

A common understanding of variables that are currently interpreted differently will increase the usefulness of the resulting FRA data and their comparability among countries. This could be a priority for future capacity building and quality assurance.

Harmonization of reporting on NWFPs: NWFPs are possibly the most challenging set of FRA variables to report on, as a number of products and units of measurement exist. A large part of NWFP production is informal and varies from year to year, and reliable data on their harvesting and use may not exist. In general, it can be said that current NWFP data from the NENA region do not allow for solid quantitative analysis, but can indicate the relative importance of products. The following are some of the areas where NWFP data for the region could be strengthened:

- *Defining NWFPs*: To ensure a harmonized approach to NWFP reporting going forward, a critical review is needed to determine whether all the products reported as NWFPs should really be classified as such or whether some are agricultural products or livestock.
- *Harmonizing units and names of NWFPs*: Some NWFP's are reported on under different names in different countries, and in some cases countries use different units for quantifying an NWFP, which makes it difficult to provide regional overviews of NWFPs. In addition, much NWFP use is informal and not captured by official statistics.
- *Ranking of NWFPs*: Some countries rank the ten most important NWFPs according to their monetary value in accordance with the FRA 2020 guidelines and specifications (FAO, 2018b), while others base the ranking on other criteria that are not described.

A consolidation and harmonization of reporting on NWFPs could be considered.

Average reference year for area data: On average, the data sources used for area reporting refer to the situation in 2009, with the year used ranging from 1992 to 2018. The fact that many countries rely on old mapping products affects the timeliness and thereby the quality of the data, and explains why the most common tier level for area data is tier 2. Identifying more timely area data for the countries still relying on old maps will improve reporting.

Independently verified forest management certification schemes as an indicator of sustainable forest management: The forestry sector in most NENA countries is small, with limited amounts of commercial high-value products, which is part of the reason why voluntary, market-driven certification schemes are currently not found in the region. It could be considered whether forest area under PEFC and FSC certification is the optimal indicator of sustainable forest management for reporting on SDG Target 15.2.1 subindicator 5 in arid countries. The use of additional or alternative indicators that are more applicable to the sparse forest types and rangelands that are characteristic of the region could be considered, as market-driven certification schemes are not likely to be common in NENA in the foreseeable future owing to low harvesting levels and uncertainty regarding markets' willingness to pay more for certified wood.

CHAPTER 14

Conclusions

FRA 2020 provide the most comprehensive assessment of global forest resources to date. The FRA 2020 report builds on decades of national reporting on forest resources, allowing the analysis of trends over three decades. In addition, the tools for measurement, reporting, communication and data sharing are continually being improved, making the data more accessible to users everywhere.
As indicated in Chapter 13, there are still opportunities for further improvement and harmonization of country-level reporting, but the main message is that the level of knowledge on forest resources has never been better. Chapter 1 summarizes, the key findings for the main variables. This chapter focuses on the key "take-home messages" from analysis of FRA 2020 data on the NENA region.

TAKE-HOME MESSAGES

The forest and OWL areas of the NENA region continue to decline at an average rate of 0.2 percent per year, driven mainly by land-use changes in the Sahelian countries. However, 12 countries in the region report larger net forest area in 2020 than 1990. Net loss of forest and OWL is mainly due to conversion to agriculture. The forest areas that are primarily converted to other land uses are naturally regenerating forests under public ownership that do not have long-term management plans and that have a low growing stock per hectare. The forest area in legally protected areas remains stable or has increased in all countries reporting on this variable.

The reported total forest growing stock of NENA region has increased over the last 30 years by an average of 0.03 percent per year. Some of the increase may be attributed to methodological differences between reporting years.

The appropriate quality of information on forest resources depends on the role of the forestry sector in the country. A key question is "what level of accuracy is appropriate in a region where the formal forest subsector plays a limited role in formal employment?" The primary purpose of national forest assessment is to improve the evidence base for informed decision-making at the national level. It serves as an objective source of information for use in the development of strategies, policies, programmes and national land-use planning and as baseline information for helping to ensure the sustainable use of forest resources. NFIs are major undertakings, and are therefore normally carried out in countries with significant forest resources and high production potential. For all countries, it is important

to have knowledge of forest areas that need special protection for conservation purposes. In general, it is beneficial for countries with a large forestry sector to have detailed insights into forest resources and their production potential in order to support national planning and economic development.
Recognition of the importance of FRA in international reporting is essential for prioritizing and allocating sufficient resources to ensure quality national reports based on quality updated information on forest resources

Forestry's contribution to employment and national economies is small and constant in absolute terms but decreasing in relative terms. This is because national economies and employment opportunities outside the forestry sector grow at a faster rate than those within the sector. The contributions of forestry to national economies and employment are likely to increase when better assessment methods are developed for capturing the situation in the informal sector, particularly in relation to NWFPs.

The true value of forest in the NENA region is not limited to its value in monetary terms. Although this is true of forests everywhere, it is particularly true for forests in NENA. The environmental, social, cultural and protective functions of forests and their supply of a multitude of goods and services benefiting forest-adjacent, often disadvantaged, communities make them essential for poverty alleviation, livelihood resilience and food security. The forests of the NENA region, especially the primary forests, also play important roles in biodiversity conservation.

Gender balance among trained foresters is improving. An increasing proportion of new graduates are female. Currently, gender balance is greatest at the bachelor degree level, but it is expected that over time more women will achieve advanced university degrees and enter formal employment in the forestry sector.

Forestry graduates and forestry education must match the future requirements of the job market. It is essential that forestry education is appropriate to the future requirements of the job market in order to retain and develop a viable forest subsector and attract, skilled motivated people. A shift of focus from trees to people in forestry education is foreseen.

There is scope for increased devolution of the management of publicly owned forests. FRA 2020 shows that the management of only a very small proportion of publicly owned forests has been devolved to non-State actors. In the NENA region, it is noteworthy that no publicly owned forest is reported as being under community management arrangements. Changing the focus of foresters from working with trees to working with people could lead to greater involvement of forest-adjacent communities and some degree of devolution of management responsibilities for publicly owned forests.

Forest areas with biodiversity conservation as the main management objective are increasing. In 2020, 20 percent of the forest areas of the NENA region has biodiversity conservation as the main management objective, an increase of 62 percent from 1990. However, primary forests are reported by only three countries, indicating a possible need to identify and protect the remaining pockets of primary forests.

Multiple use as the primary management objective is becoming more common. In the NENA region, 22 percent of forest area has multiple use as its designated primary management objective (a 38 percent increase from 1990). As countries continue to develop balanced approaches to forest management based on economic, biological and social sustainability, multiple use will likely continue to become more common as the primary management objective.

The three NFIs currently being developed with FAO support in the Sudan, Tunisia and Lebanon will substantially increase knowledge at the national and regional levels. The Sudan accounts for 44 percent of the region's forest area and therefore has a very big impact on the overall figures and trends for forest resources in the NENA region. The Sudan's NFI will be a great step in generating more accurate data on the forest resources of the Sudan and the region as a whole.

The initiatives under the African Union's Great Green Wall project are not visible in the FRA 2020 data trends for forest cover of Mauritania and the Sudan.

National reforestation efforts in Lebanon and Morocco are visible in the FRA 2020 data, leading to increased forest cover in the two countries.

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Appendices

Appendix 1. Growing stock naturally regenerating forest (from FRA2020 Table 2a)

Country /territory	Growing stock m³/ha (over bark)									Difference (m³/ha) 1990-2020	Area 2020 (000 ha)	Total growing stock 2020 (million m³)	Average growing stock (m³/ha)
	1990	2000	2010	2015	2016	2017	2018	2019	2020				
Algeria	44.15	44.15	44.15	44.15	44.15	44.15	44.15	44.15	44.15	0	1 439.00	63.53	
Bahrain	0	0	0	0	0	0	0	0	0	0	-	-	
Egypt	0	0	0	0	0	0	0	0	0	0	-	-	
Iran (Islamic Republic of)	47.27	46.14	48.12	48.12	48.12	48.12	48.12	48.12	48.12	0.85	9 750.98	469.22	
Iraq	37	37	37	37	37	37	37	37	37	0	735.21	27.20	
Jordan	29.84	29.84	29.84	29.84	29.84	29.84	29.84	29.84	29.84	0	50.60	1.51	
Kuwait	0	0	0	0	0	0	0	0	0	0	-	-	
Lebanon	35.64	35.64	35.64	35.64	35.64	35.64	35.64	35.64	35.64	0	142.93	5.09	
Libya*	0	0	0	0	0	0	0	0	0	0	-	-	
Mauritania	20	20	20	20	26	26	26	26	26	6	269.30	7.00	
Morocco	24.3	26.46	27.07	27.12	27.11	27.11	27.11	27.11	27.1	2.8	5 107.59	138.42	
Oman	55.1	55.1	55.1	55.1	55.1	55.1	55.1	55.1	55.1	0	2.00	0.11	
Palestine*	0	0	0	0	0	0	0	0	0	0	-	-	
Qatar	0	0	0	0	0	0	0	0	0	0	-	-	
Saudi Arabia	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	0	977.00	8.21	
Sudan	20	20	20	20	20	20	20	20	20	0	18 229.55	364.59	
Syrian Arab Republic	29.84	29.84	29.84	29.84	29.84	29.84	29.84	29.84	29.84	0	310.68	9.27	
Tunisia	31.56	33.83	36.74	37.65	36.94	35.57	35.05	35.06	35.07	3.51	488.28	17.12	
United Arab Emirates*	0	0	0	0	0	0	0	0	0	0	-	-	
Yemen	9.19	9.19	9.19	9.19	9.19	9.19	9.19	9.19	9.19	0	549.00	5.05	
Total											**38 052.12**	**1 116.32**	**29.3**

* National datasets did not provide break down total forest growing stock into naturally regenerating forests and planted forests – therefore zero value

Appendix 2. Growing stock planted forest (from FRA2020 Table 2a)

Country /territory	Growing stock m³/ha (over bark)									Difference (m³/ha) 1990-2020	Area 2020 (000 ha)	Total growing stock 2020 (million m³)	Average growing stock (m³/ha)
	1990	2000	2010	2015	2016	2017	2018	2019	2020				
Algeria	46.3	46.3	46.3	46.3	46.3	46.3	46.3	46.3	46.3	0	510	23.61	
Bahrain*	0	0	0	0	0	0	0	0	0	0	0.7		
Egypt	120	120	120	120	120	120	120	120	120	0	44.98	5.40	
Iran* (Islamic Republic of)	0	0	0	0	0	0	0	0	0	0	1 000.89		
Iraq	37	37	37	37	37	37	37	37	37	0	89.79	3.32	
Jordan	30.06	30.06	30.06	30.06	30.06	30.06	30.06	30.06	30.06	0	46.9	1.41	
Kuwait*	0	0	0	0	0	0	0	0	0	0	6.25	-	
Lebanon	35.64	35.64	35.64	35.64	35.64	35.64	35.64	35.64	35.64	0	0.35	0.01	
Libya*	0	0	0	0	0	0	0	0	0	0	217	-	
Mauritania	40	40	40	40	40	40	40	40	40	0	43.57	1.74	
Morocco	10.46	16.56	20.4	22.57	22.49	22.73	22.94	23.17	23.42	12.96	634.6	14.86	
Oman	30.9	30.9	30.9	30.9	30.9	30.9	30.9	30.9	30.9	0	0.5	0.02	
Palestine*	0	0	0	0	0	0	0	0	0	0	0	-	
Qatar*	0	0	0	0	0	0	0	0	0	0	0	-	
Saudi Arabia*	0	0	0	0	0	0	0	0	0	0	0	-	
Sudan	20	20	20	20	20	20	20	20	20	0	130	2.60	
Syrian Arab Republic	30.06	30.06	30.06	30.06	30.06	30.06	30.06	30.06	30.06	0	211.4	6.35	
Tunisia	11.36	20.89	25.44	25.18	24.5	23.4	22.87	22.69	22.51	11.15	214.48	4.83	
United Arab Emirates*	0	0	0	0	0	0	0	0	0	0	0	0	
Yemen*	0	0	0	0	0	0	0	0	0	0	0	0	
Total area planted forest											**3 151.41**		
Area of planted forests where country reports did not contain growing stock data (marked with * in table)											**1 224.84**		
Area of planted forests where country reports contained growing stock data											**1 926.57**	**64.16**	**33.3**

Appendix 3. Growing stock plantation forest (from FRA2020 Table 2a)

Country /territory	Growing stock m³/ha (over bark)									Difference (m³/ha) 1990-2020	Area 2020 (000 ha)	Total growing stock 2020 (million m³)	Average growing stock (m³/ha)
	1990	2000	2010	2015	2016	2017	2018	2019	2020				
Algeria	0	0	0	0	0	0	0	0	0	0	0	-	
Bahrain*	0	0	0	0	0	0	0	0	0	0	0.7	-	
Egypt*	0	0	0	0	0	0	0	0	0	0	0	-	
Iran* (Islamic Republic of)	0	0	0	0	0	0	0	0	0	0	1 000.89	-	
Iraq*	0	0	0	0	0	0	0	0	0	0	89.79	-	
Jordan	30.06	30.06	30.06	30.06	30.06	30.06	30.06	30.06	30.06	0	46.9	1.41	
Kuwait*	0	0	0	0	0	0	0	0	0	0	6.25	-	
Lebanon*	0	0	0	0	0	0	0	0	0	0	0	-	
Libya*	0	0	0	0	0	0	0	0	0	0	217	-	
Mauritania	0	0	0	0	0	0	0	0	0	0	0	-	
Morocco	10.46	16.56	20.4	22.57	22.49	22.73	22.94	23.17	23.42	12.96	634.6	14.86	
Oman*	0	0	0	0	0	0	0	0	0	0	0	-	
Palestine*	0	0	0	0	0	0	0	0	0	0	0	-	
Qatar*	0	0	0	0	0	0	0	0	0	0	0	-	
Saudi Arabia*	0	0	0	0	0	0	0	0	0	0	0	-	
Sudan	20	20	20	20	20	20	20	20	20	0	130	2.60	
Syrian Arab Republic	30.06	30.06	30.06	30.06	30.06	30.06	30.06	30.06	30.06	0	211.4	6.35	
Tunisia	18.29	33.57	36.42	35.38	34.41	32.84	32.08	31.82	31.56	13.27	71.58	2.26	
United Arab Emirates*	0	0	0	0	0	0	0	0	0	0	0	-	
Yemen*	0	0	0	0	0	0	0	0	0	0	0	-	
Total area plantation forest											**2 409.11**		
Area of plantation forests where country reports did not contain growing stock data (marked with * in table)											**1 314.63**		
Area of plantation forests where country reports contained growing stock data											**1 094.48**	**27.49**	**25.1**

Appendix 4. Growing stock other planted forest (from FRA2020 Table 2a)

Country /territory	Growing stock m³/ha (over bark)									Difference (m³/ha) 1990-2020	Area 2020 (000 ha)	Total growing stock 2020 (million m³)	Average growing stock (m³/ha)
	1990	2000	2010	2015	2016	2017	2018	2019	2020				
Algeria	46.3	46.3	46.3	46.3	46.3	46.3	46.3	46.3	46.3	0	510	23.61	
Bahrain	0	0	0	0	0	0	0	0	0	0	0	-	
Egypt	120	120	120	120	120	120	120	120	120	0	44.98	5.40	
Iran (Islamic Republic of)	0	0	0	0	0	0	0	0	0	0	0	-	
Iraq	0	0	0	0	0	0	0	0	0	0	0	-	
Jordan	0	0	0	0	0	0	0	0	0	0	0	-	
Kuwait	0	0	0	0	0	0	0	0	0	0	0	-	
Lebanon*	0	0	0	0	0	0	0	0	0	0	0.35	-	
Libya	0	0	0	0	0	0	0	0	0	0	0	-	
Mauritania	40	40	40	40	40	40	40	40	40	0	43.57	1.74	
Morocco	0	0	0	0	0	0	0	0	0	0	0	-	
Oman	30.9	30.9	30.9	30.9	30.9	30.9	30.9	30.9	30.9	0	0.5	0.02	
Palestine	0	0	0	0	0	0	0	0	0	0	0	-	
Qatar	0	0	0	0	0	0	0	0	0	0	0	-	
Saudi Arabia	0	0	0	0	0	0	0	0	0	0	0	-	
Sudan	0	0	0	0	0	0	0	0	0	0	0	-	
Syrian Arab Republic	0	0	0	0	0	0	0	0	0	0	0	-	
Tunisia	14.62	19.99	20.09	19.55	18.68	18.26	18.12	17.92	14.62	9.98	142.9	2.56	
United Arab Emirates	0	0	0	0	0	0	0	0	0	0	0	-	
Yemen	0	0	0	0	0	0	0	0	0	0	0	-	
Total area other planted forest											**742.3**		
Area of other planted forests where country reports did not contain growing stock data (marked with * in table)											**0.35**		
Area of other planted forests where country reports contained growing stock data											**741.95**	**33.33**	**44.92**

Appendix 5. Growing stock Other wooded land (OWL) (from FRA2020 Table 2a)

Country /territory	Growing stock m³/ha (over bark)									Difference (m³/ha) 1990-2020	Area 2020 (000 ha)	Total growing stock 2020 (million m³)	Average growing stock (m³/ha)
	1990	2000	2010	2015	2016	2017	2018	2019	2020				
Algeria		3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	0	2 590.00	9.58	
Bahrain		0	0	0	0	0	0	0	0	0	0.09	0	
Egypt		0	0	0	0	0	0	0	0	0	0	0	
Iran (Islamic Republic of)		0	0	0	0	0	0	0	0	0	3 627.02	0	
Iraq		0	0	0	0	0	0	0	0	0	259.00	0	
Jordan		0	0	0	0	0	0	0	0	0	51.00	0	
Kuwait		0	0	0	0	0	0	0	0	0	0	0	
Lebanon*		5.08	5.08	5.08	5.08	5.08	5.08	5.08	5.08	0	170.16	0.86	
Libya		0	0	0	0	0	0	0	0	0	330.00	0	
Mauritania		0	0	0	0	0	0	0	0	0	2 194.79	0.00	
Morocco		0.09	0.12	0.15	0.17	0.75	0.77	0.8	0.83	0.76	1 223.70	1.04	
Oman		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0	9.00	0.02	
Palestine		0	0	0	0	0	0	0	0	0	0	0	
Qatar		0	0	0	0	0	0	0	0	0	0.50	0	
Saudi Arabia		5	5	5	5	5	5	5	5	0	959.00	4.80	
Sudan		3.3	3.2	3.1	3	3	3	3	3	-0.30	19 893.26	59.68	
Syrian Arab Republic		0	0	0	0	0	0	0	0	0	35.43	0	
Tunisia		0	0	0	0	0	0	0	0	0	307.77	0	
United Arab Emirates		0	0	0	0	0	0	0	0	0	4.85	0	
Yemen		8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	0	1 406.00	11.95	
Total area other wooded land											**33 061.57**		
Area of other wooded land where country reports did not contain growing stock data (marked with * in table)											**6 810.45**		
Area of other wooded land where country reports contained growing stock data											**26 251.12**	**87.94**	**3.35**

Appendix 6. Growing stock composition

Growing stock composition (million m³)	Algeria		Iran (Islamic Republic of)		Lebanon		Libya		Mauritania		Morocco		Oman		Saudi Arabia		Sudan		Tunisia		Total	
	2010		2020		2015		2020		2020		2020						2020		2020			
	Growing stock	% / rank	Growing stock	% / rank	Growing stock	% / rank	Growing stock	% / rank	Growing stock	% / rank	Growing stock	% / rank	Growing stock	% / rank	Growing stock	% / rank	Growing stock	% / rank	Growing stock	% / rank	Growing stock	%
Native species																						
Acacia albida									0.02	0.2											0.02	0.00
Acacia ehrenbergiaana													--	7							0	0.00
Acacia mellifera																	5.3	1.4			5.3	0.47
Acacia nilotica									1.43	16.3											1.43	0.13
Acacia senegal									0.02	0.2			--	6			3.67	1.0			3.69	0.33
Acacia seyal									0.02	0.2							10.18	2.8			10.2	0.91
Acacia spp.							2.4	30.5							--	2					2.4	0.21
Acacia tortilis									1.09	12.5			--	1					0.12	0.5	1.21	0.11
Acer sp.			31.5	6.7																	31.5	2.81
Albizia amara																	18.2	5.0			18.2	1.63
Alnus sp.			36.7	7.8																	36.7	3.28
Anogeissus leiocarpus									0.01	0.1							15.09	4.1			15.08	1.35
Argania spinosa L. Skeels											18.82	12.3									18.82	1.68
Avicennia marina															--	7					0	0.00
Balanités aegyptiaca									0.5	5.7							24.19	6.6			24.69	2.21
Capparis decidua															--	9					0	0.00
Carpinus betulus			150	32.0																	150	13.40
Cedrus atlantica Endl.											25.17	16.4									25.17	2.25
Cedrus libani					0.31	6.2															0.31	0.03
Cedrus ssp	1.51	1.8																			1.51	0.13
Combretum glutinosom									0.09	1.0											0.09	0.01
Combretum sp.																	15.35	4.2			15.35	1.37
Cupressus sempervirens																			0.09	0.4	0.09	0.01
Diospyrus lotus			13.8	2.9																	13.8	1.23
Fagus orientalis			154.4	32.9																	154.4	13.80
Ficus spp.															--	10					0	0.00
Fraxinus sp.			1.5	0.3																	1.5	0.13
Hyphaene thebaica															--	8					0	0.00
Juniperus drupacea					0.09	1.8															0.09	0.01
Juniperus excelsa					0.3	6.0							--	5							0.3	0.03
Juniperus phoenicea																			0.24	1.1	0.24	0.02
Juniperus procera															--	1					0	0.00
Juniperus sp.											9.49	6.2									9.49	0.85
Lannea fruiticosa																	3.12	0.8			3.12	0.28
Maerua crassifolia													--	4							0	0.00
Olea europaea															--	4					0	0.00
Ostrya carpinifolia					0.02	0.4															0.02	0.00

Growing stock composition (million m³)	Algeria		Iran (Islamic Republic of)		Lebanon		Libya		Mauritania		Morocco		Oman		Saudi Arabia		Sudan		Tunisia		Total	
	2010		2020		2015		2020		2020		2020						2020		2020			
	Growing stock	% / rank	Growing stock	% / rank	Growing stock	% / rank	Growing stock	% / rank	Growing stock	% / rank	Growing stock	% / rank	Growing stock	% / rank	Growing stock	% / rank	Growing stock	% / rank	Growing stock	% / rank	Growing stock	%
Pavotia persica			23	4.9																	23	2.06
Piliostigma reticulata									0.02	0.2											0.02	0.00
Pinus brutia					1.32	26.4															1.32	0.12
Pinus halepensis	53	61.8									11.39	7.4							10.58	48.2	74.97	6.70
Pinus pinaster	1.9	2.2																	0.33	1.5	2.23	0.20
Pinus pinea					1.54	30.8															1.54	0.14
Pinus spp.							0.43	5.5													0.43	0.04
Platanus orientalis					0.02	0.4															0.02	0.00
Prosopis cineraria													--	3							0	0.00
Quercus calliprinos					0.18	3.6															0.18	0.02
Quercus canariensis Wild											2.47	1.6									2.47	0.22
Quercus castaneafolia			30.2	6.4																	30.2	2.70
Quercus cerris					0.96	19.2															0.96	0.09
Quercus faginea	0.81	0.9																	1	4.6	1.81	0.16
Quercus ilex L.																			0.01	0.0	0.01	0.00
Quercus infectoria					0.19	3.8															0.19	0.02
Quercus rotundifolia	6.1	7.1									54.95	35.8									61.05	5.45
Quercus suber L.											8.1	5.3							4.38	20.0	12.48	1.12
Sclerocarya birrea																	7.67	2.1			7.67	0.69
Tamarix spp.															--	6					0	0.00
Terminalia brownii																	2.94	0.8			2.94	0.26
Tetraclinis articulata											8.2	5.3							0.41	1.9	8.61	0.77
Tillia sp			9.2	2.0																	9.2	0.82
Ziziphus mauritiaca									0.21	2.4											0.21	0.02
Zizphus spina-christi													--	2	--	3					0	0.00
Remaining native tree species	20.86	24.3	19	4.0	0.07	1.4			4.54	51.9	8.62	5.6					261.5	71.2	1.58	7.2	316.2	28.25
Introduced species																						
Eucalyptus sp.	1.57	1.8					5.04	64.0			6.2	4.0							0.77	3.5	13.58	1.21
Prosopis juliflora									0.8	9.1					--	5					0.8	0.07
Pinus pinea L.																			0.76	3.5	0.76	0.07
Acacia sp																			0.58	2.6	0.58	0.05
Remaining introduced tree species																			1.1	5.0	1.1	0.10
Total growing stock	**85.75**	**100**	**469.3**	**100**	**5**	**100**	**7.87**	**100**	**8.75**	**100**	**153.4**	**100**					**367.2**	**100**	**21.95**	**100**	**1119**	**100**

Appendix 7. NWFP value reported to FRA 2020, NENA Region

NWFP Categories Plant products / raw material

Country	Rank	Name of NWFP product	Key species	Quantity	Unit	Value ** (1 000 USD)
1. Food (2015 total: 99 244 000 USD)						
Iran (Islamic Republic of)	#2	Asafetida	Ferula assa-foetida	168 460	kg	38 139
Iran (Islamic Republic of)	#4	Truffle	Tuber spp.	250 000	kg	3 352
Iran (Islamic Republic of)	#8	Almond	Amygdalus spp.	3 550	kg	107
Mauritania*	#2	Fruits	Balanites aegyptiaca	10 000	tonne	1 623
Mauritania*	#3	Jujube fruit	Ziziphus mauritiana	7 000	tonne	682
Sudan	#2	Tabaldi fruits	Adansonia digitata	50 000	tonne	16 476
Sudan	#3	Dom fruits	Hyphaene thebaica	90 000	tonne	3 295
Sudan	#4	Aradeib (Tamarind) fruits	Tamarindus indica	10 000	tonne	8 238
Sudan	#5	Goddeim fruits	Grewia tenax	20 000	tonne	24 713
Sudan*	#6	Heglig fruits	Balanites aegyptiaca	80 000	tonne	2 471
Tunisia	#4	Cones and Seeds	Pinu halepensis	1 643	tonne	91
Tunisia	#7	Olives	Olea Europaea	90	ha	41
Tunisia	#8	Mushrooms		56 255	ha	16
2. Fodder (2015 total: 568 000 USD)						
Mauritania	#4	Pods	Acacia tortilis	1 500	tonne	325
Morocco	#8	Forage units	Misc.	1 500	tonne	244
3. Raw material for medicine and aromatic products (2015 total: 131 230 000 USD)						
Iran (Islamic Republic of)	#1	Thyme	Thymus vulgaris	267 675	kg	996
Iran (Islamic Republic of)	#3	Galbanum	Ferula gummosa	50 846	kg	2 045
Iran (Islamic Republic of)	#5	Licorice	Glycyrrhiza glabra	69 395	kg	186
Iran (Islamic Republic of)	#6	Natural gum	Pistacia atlantica	78 300	kg	4 725
Iran (Islamic Republic of)	#7	Astragal	Astraglus spp.	23 149	kg	5 432
Iran (Islamic Republic of)	#9	Borage	Anchusa italica Retz	137 808	kg	277
Iran (Islamic Republic of)	#10	Capers	Capparis spinosa	32 000	kg	32
Morocco	#1	Argan oil	Argania spinosa	4 000	tonne	56 884
Morocco	#2	Carob fruit	Ceratonia siliqua	24 800	tonne	43 638
Morocco	#4	Rosemary essential oils and leaves	Salvia rosmarinus	7 900	tonne	10 104
Morocco	#5	Thyme essential oils and leaves	Thymus sp.	2 000	tonne	5 079
Morocco	#6	Myrtle essential oils	Myrtus sp.	5	tonne	601
Morocco	#7	Flowers of heather	Ericaceae sp.	65	tonne	264

NWFP Categories Plant products / raw material	Country	Rank	Name of NWFP product	Key species	Quantity	Unit	Value ** (1 000 USD)
	Morocco	#9	Cedar essentiel oil	Cedrus atlantica	2 163	tonne	107
	Morocco	#10	Oregano leaves	Origanum sp.	45	tonne	96
	Tunisia	#2	Rosemary	Salvia rosmarinus	82 185	ha	604
	Tunisia	#5	Myrtle	Myrtus sp.	10 665	ha	83
	Tunisia	#6	Mastic	Pistacia lentiscus	13 264	ha	77
	4. Raw material for utensils handicrafts and construction (2015 total: 14 847 000 USD)						
	Algeria	#1	Cork	Quercus suber	86 852	Quintal	1 925
	Morocco	#3	Cork	Quercus suber	100 085	m^3	10 460
	Tunisia *	#1	Cork	Quercus suber	35	tonne	2 455
	Tunisia	#10	Produit de carrière		9 300	m^3	7
	5. Exudates (2015 total: 12 483 000 USD)						
	Mauritania	#1	Gum Arabic	Acacia senegal	3 000	tonne	2 597
	Sudan	#1	Gum Arabic	Acacia senegal	60 000	tonne	9 885
	6. Other plant products (2015 total: 279 000 USD)						
	Tunisia *						7
	Morocco *						272
	7. Living animals (2015 total: 4 127 000 USD)						
	Sudan	#7	Living animals	Gazelles	50	unit	4 119
	Tunisia	#9	Living animals	Camels	19	unit	8
	8. Hides, skins and trophies (2015 total: 13 181 000 USD)						
	Sudan	#8	Hides, Skins and trophis	Gazelles, big cats, pythons. etc.	-	unit	13 181
	9. Raw material for medicine and aromatic products (2015 total: 69 302 000 USD)						
	Sudan	#9	Honey	African honey bees	2	tonne	65 903
	Saudi Arabia	#1	Honey	Acacia spp	51	tonne	3 400
	10. Wild meat (2015 total: 2 090 000 USD)						
	Sudan	#10	Game meat	Gazelles, antelopes, buffaloes, birds, fish, etc.	10	tonne	1 648
	Tunisia	#3	Game meat	Boar			442

* NWFP entries that for reasons of standardization, have been reclassified to another NWFP compared to original reporting

** Exchange-rates from www.oanda.com 31.12.2015 have been used to determine USD value

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